6/30/88

A5200-4.19-F

INSURANCE SPECIAL REPORT

Automobile Insurance Losses
A Comparison of California and National Results
1985-87 Passenger Cars

Highway Loss Data Institute

A-30

Highway Loss Data Institute
Insurance Special Report

Automobile Insurance Losses
A Comparison of California and National Results
1985-87 Passenger Cars
HLDI A-30

Permission to quote from or to reproduce material from this publication is granted when due acknowledgement is made.
Highway Loss Data Institute—Watergate Six Hundred— Washington, D.C. 20037
Research Report HLDI A-30, May 1988
© 1988/HLDI

The membership of the Highway Loss Data Institute Board of Directors and the Technical Resource Committee represents insurance companies that are supplying data to HLDI. Financial support for HLDI is provided through the Insurance Institute for Highway Safety, which in turn is supported by most automobile insurers either directly or through their trade associations.

Board of Directors

J. B. Conners, Chairman
Liberty Mutual Insurance Company

M. Albaum
Prudential Property and Casualty Insurance Company

C. A. Bryan
United Services Automobile Association

E. Gottheim
Government Employees Insurance Company

G. Jerabek
Nationwide Mutual Insurance Company

G. C. Klingman
The Travelers Insurance Companies

R. S. Lawson
Alliance of American Insurers

A. Longley-Cook
Aetna Life and Casualty

D. Snyder
American Insurance Association

W. W. Sorenson
State Farm Mutual Automobile Insurance Company

J. S. Trees
Allstate Insurance Company

T. E. Troxel
National Association of Independent Insurers

B. O'Neill, ex officio
Highway Loss Data Institute

Technical Resource Committee

M. Albaum, Chairman
Prudential Property and Casualty Insurance Company

C. A. Bryan
United Services Automobile Association

R. O. Elder
Highway Loss Data Institute

E. Gottheim
Government Employees Insurance Company

G. Jerabek
Nationwide Mutual Insurance Company

G. C. Klingman
The Travelers Insurance Companies

A. Longley-Cook
Aetna Life and Casualty

R. Muleski
Liberty Mutual Insurance Company

B. O'Neill
Highway Loss Data Institute

W. W. Sorenson
State Farm Mutual Automobile Insurance Company

J. S. Trees
Allstate Insurance Company

CONTENTS

1 **Summary**
2 **Introduction**
2 **California Compared to the Nation**
2 Driver Age
3 Vehicle Characteristics
4 Population Density
6 Individual Model Results
11 **Appendix A** Standardization
11 **Appendix B** Definitions
12 **HLDI Publications**

2 **Figure 1** Collision Claim Frequency
2 **Figure 2** Collision Average Loss Payment Per Claim
2 **Figure 3** Collision Average Loss Payment Per Insured Vehicle Year
3 **Figure 4** Theft Claim Frequency
3 **Figure 5** Theft Average Loss Payment Per Claim
3 **Figure 6** Theft Average Loss Payment Per Insured Vehicle Year
3 **Figure 7** Percentage of Collision Coverage Exposure By Car Size
4 **Figure 8** Collision Coverage Losses By Car Size
4 **Figure 9** Theft Coverage Losses By Car Size
5 **Figure 10** Percentage of Collision Coverage Exposure By Density Category
5 **Figure 11** Collision Coverage Losses By Density Category
5 **Figure 12** Theft Coverage Losses By Density Category
5 **Figure 13** Percentage of Collision Coverage Exposure — Small Cars
5 **Figure 14** Collision Claim Frequencies By Density Category — Small Cars
5 **Figure 15** Collision Coverage Losses By Density Category — Small Cars
6 **Figure 16** Theft Claim Frequencies By Density Category — Small Cars
6 **Figure 17** Theft Coverage Losses By Density Category — Small Cars
4 **Table 1** Percentage Distribution of Collision Exposure by Body Style
7 **Table 2** 1986 Models with the Worst Collision Results — Proportion of Insurance Exposure
7 **Table 3** 1986 Models with the Best Collision Results — Proportion of Insurance Exposure
8 **Table 4** 1986 Models with the Worst Theft Results — Proportion Insurance Exposure
8 **Table 5** 1986 Models with the Best Theft Results — Proportion of Insurance Exposure
9 **Table 6** 1984-86 Models with the Worst Injury Loss Experience — Proportion of Insurance Exposure
9 **Table 7** 1984-86 Models with the Best Injury Loss Experience — Proportion of Insurance Exposure
10 **Table 8** 1986 Models with the Most Collision Insurance Coverage Exposure

SUMMARY

This Highway Loss Data Institute special report compares insurance losses from California with national results for recent model year passenger cars. The report also examines the extent to which the differences between insurance losses in California and the nation are affected by factors known to be strongly related to automobile insurance losses.

Principal Findings

- Collision claim frequencies, average loss payments per claim, and average loss payments per insured vehicle year are all higher in California than they are nationally. The collision coverage average loss payment per insured vehicle year was more than $200 in California compared to $180 nationally.
- Theft claim frequencies are much higher in California than nationally, but average loss payments per claim are lower. The theft coverage average loss payment per insured vehicle year was $24 in California and nationally.

Driver Age

- Distributions of exposure by operator age group are similar for California and the United States.

Vehicle Characteristics

- California has a much greater proportion of small cars insured and a smaller proportion of large cars insured than does the United States. This vehicle characteristic is important in assessing California insurance losses because smaller cars as a group have higher collision and injury insurance losses than larger cars.
- Within each car size class, California also has larger proportions of the sports and specialty models that generate high insurance losses.

Population Density

- In comparison with the United States, California has a substantially larger proportion of its insured vehicles garaged in very urban locations and a substantially smaller proportion in rural locations. This environmental characteristic is important because insurance losses — both injury and collision — are highest in very urban areas.

Individual Model Results

- In general, 1986 model passenger cars with the worst injury, collision, and theft losses comprised a greater proportion of the insured cars in California than in the United States.
- In general, 1986 model passenger cars with the best injury, collision, and theft losses comprised a smaller proportion of the insured cars in California than in the United States.

INTRODUCTION

The cost of automobile insurance is currently the subject of much public debate and discussion in California. To provide information and facts relevant to this debate, this Highway Loss Data Institute (HLDI) report compares insurance loss results from the state of California with national results.

CALIFORNIA COMPARED TO THE NATION

This report compares HLDI collision and theft insurance loss experience for California with experience for the entire United States for 1985-87 model year passenger cars. The California results are based on a total of 1.2 million insured vehicle years of exposure for the three model years and those for the total United States on 14 million years of exposure.

Figure 1 shows that collision coverage claims (per 100 insured vehicle years) for the three model years were consistently more frequent in California than in the United States as a whole. The differences average about five percent for the three model years. Figure 2 shows that the average loss payments per collision claim are higher for California than for the United States. These differences are more pronounced than those for claim frequency, averaging about nine percent for the three years. Figure 3 shows average loss payments per insured vehicle year — a measure that combines claim frequency and average loss payment per claim and, therefore, represents the best overall measure of collision coverage loss experience. These results show that California's losses on average are 13 percent higher than the national figures.

Theft coverage results, which are given in Figures 4 through 6, are somewhat less consistent than those for collision losses. Figure 4 shows that theft claim frequencies (per 1,000 insured vehicle years) are consistently and substantially higher in California for all three model years. The increases ranged from 38 percent for 1985 models to 44 percent for 1986 models. However, as shown in Figure 5, the average payment per theft claim in California is $500 to $700 less than the average theft claim nationally. This phenomenon offsets the higher claim frequencies in California and results in average loss payments per insured vehicle year that, when aggregated over the three model years, show little differences from national results (Figure 6).

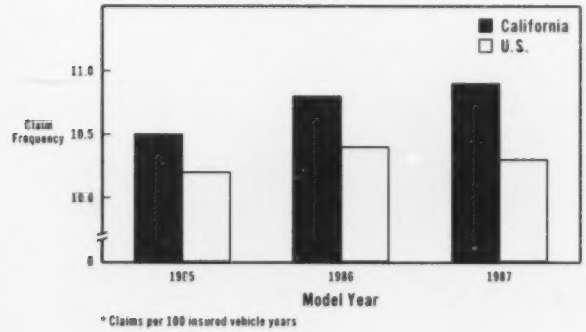
Automobile insurance losses can be expected to vary from state to state for many reasons, including differences due to driver characteristics, the vehicle population, and the environment. In California, these differences are dramatic: collision claim frequencies and average loss payments per claim are higher, theft claim frequencies are higher, and theft claim averages are lower than national results.

The remainder of this report explores the extent to which differences between insurance losses in California and the nation as a whole can be explained by factors that have been shown to be strongly related to automobile insurance losses. It also compares insurance loss results for specific vehicle models with particularly good or bad results as identified from recent HLDI collision, theft, and injury reports.

Driver Age

HLDI has only limited information on driver age as recorded in insurers' company files. This factor is important to examine because youthful operators tend to generate more and higher insurance losses than older drivers. The distributions of exposure by age group for 1985-87 passenger cars are very similar for California and the United States. (See Appendix B for definitions.) California has a slightly lower proportion of youthful exposure (9 percent) compared to the United States (11 percent). This small difference is not likely to contribute significantly to the observed differences in insurance losses between California and all of the United States.

Figure 1
Collision Claim Frequency*
1985-87 Models, California vs. U.S.



* Claims per 100 insured vehicle years

Figure 2
Collision Average Loss Payment Per Claim
1985-87 Models, California vs. U.S.

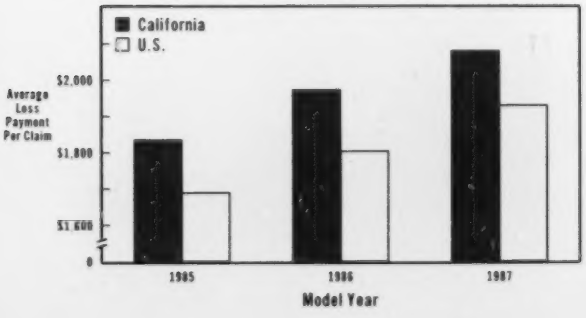


Figure 3
Collision Average Loss Payment Per Insured Vehicle Year
1985-87 Models, California vs. U.S.

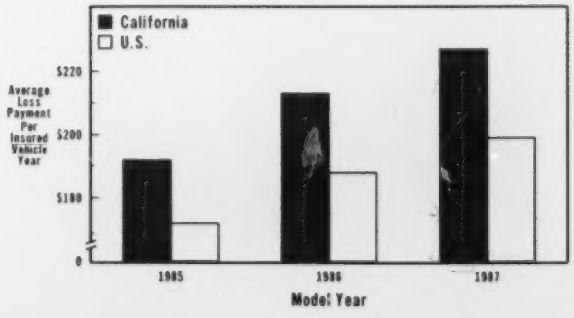
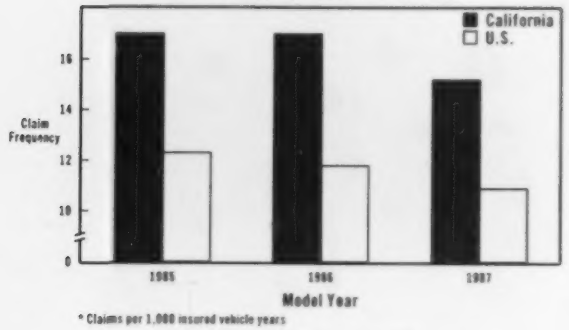


Figure 4
Theft Claim Frequency*
1985-87 Models, California vs. U.S.



* Claims per 1,000 insured vehicle years

Figure 5
Theft Average Loss Payment Per Claim
1985-87 Models, California vs. U.S.

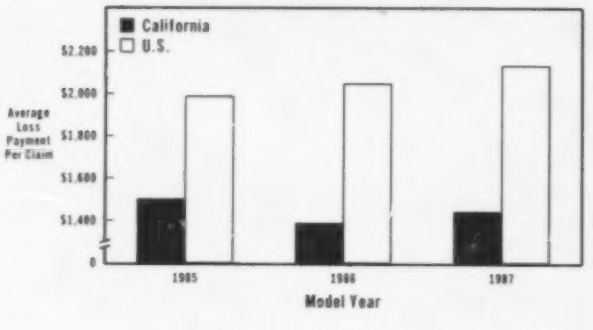


Figure 6
Theft Average Loss Payment Per Insured Vehicle Year
1985-87 Models, California vs. U.S.

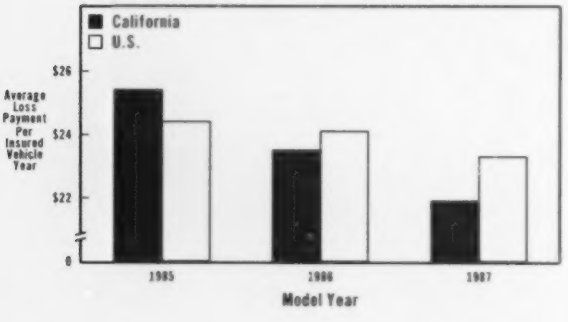
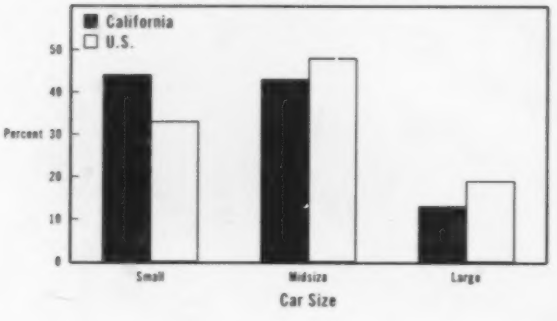


Figure 7
Percentage of Collision Coverage Exposure By Car Size
1985-87 Models, California vs. U.S.



Vehicle Characteristics

Vehicle characteristics have a very strong influence on both the frequency and severity of insurance losses. Figure 7 shows the car size mix of 1985-87 private passenger vehicles insured under collision coverage in California compared to the United States as a whole: California has a much greater proportion of insured small cars (44 percent) than the national population (33 percent).

HLDI data have consistently shown that small cars have much higher insurance losses than large cars under both collision and personal injury protection coverages. In contrast, large cars, which have the best insurance losses under both collision and personal injury protection coverages, are a smaller percentage of the insured vehicle population in California than nationally (13 percent vs. 19 percent). Figure 8 shows collision coverage average loss payments per insured vehicle year by car size for California and the United States. This graph clearly shows that smaller cars have higher loss payments than larger cars in both California and for the nation as a whole. In addition, in each car size, California's collision losses are higher than they are nationally. When California and the United States collision losses in Figure 8 are aggregated across car size using the proportional size class mixtures displayed in Figure 7, the overall average loss payment per insured vehicle year for collision coverage in California is more than $200 compared to about $180 for the United States.

Figure 9 displays theft coverage average loss payments per insured vehicle year by car size for California and the United States. For the United States as a whole, larger cars, on average, have higher theft losses than smaller cars. In California, however, theft losses for small cars exceed those of midsize and large cars. California's overall theft losses are, therefore, strongly influenced by the larger proportion of higher loss small cars. When the theft losses in Figure 9 are summarized across size class, average loss payments per insured vehicle year are approximately the same, about $24, for both California and the total United States.

Vehicle body style is also an important factor in insurance losses. Small and midsize sports and specialty models and small two-door models consistently have had the worst collision loss results, and large four-door models and station wagons have had the best results. Table 1 shows that the vehicle mix by car size and body style also varies substantially between California and the United States. It also shows that California has proportionately more of the high loss vehicles — sports and specialty cars and small two-door models — and fewer of the low loss vehicles — large four-door and station wagon models. Sports and specialty models as a group account for 22 percent of the vehicles in California but only 15 percent of vehicles nationally.

Figure 8
Collision Coverage Losses By Car Size
1985-87 Models, California vs. U.S.

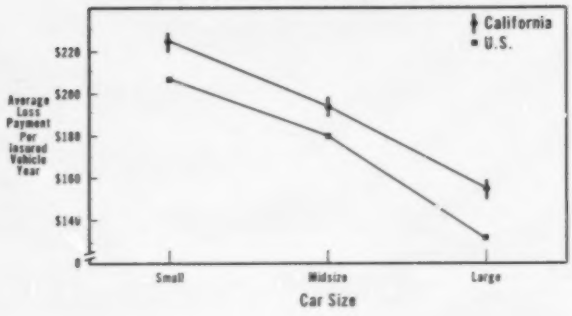


Figure 9
Theft Coverage Losses By Car Size
1985-87 Models, California vs. U.S.

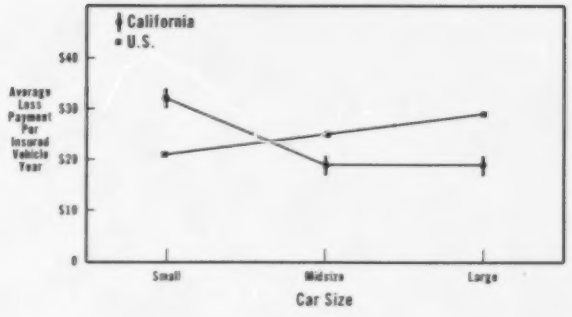


Table 1
Percentage Distribution of Collision Exposure By Body Style for 1985-87 Models

Body Style	California %	U.S. %
Small Passenger Cars		
Sports/Specialty	7	4
Two-Door	19	14
Four-Door	14	13
Station Wagon	4	3
Midsize Passenger Cars		
Sports/Specialty	10	7
Two-Door	9	14
Four-Door	20	23
Station Wagon	3	4
Large Passenger Cars		
Sports/Specialty	5	4
Two-Door	1	1
Four-Door	4	9
Station Wagon	4	4

Population Density

Another factor that strongly influences insurance losses is the degree of urbanization or density of vehicles in a particular area. Several HLDI reports have shown strong relationships between the degree of urbanization and insurance losses for injury, collision, and theft, with the most frequent and highest losses occurring in the more urban areas[1-4]. In its most recent study, HLDI utilized a population density classification scheme developed by the United States Department of Agriculture (USDA). Based on the USDA scheme, HLDI defined the following six density categories:

1. Nonmetropolitan counties not adjacent to a metropolitan area;
2. Nonmetropolitan counties adjacent to a metropolitan area;
3. Counties in metropolitan areas of less than 250,000 population;
4. Counties in metropolitan areas of 250,000 to 1,000,000 population;
5. Fringe counties of metropolitan areas of 1,000,000 population or more; and
6. Central counties of metropolitan areas of 1,000,000 population or more.

Figure 10 shows that nationally the three most rural categories together account for about 25 percent of the insured vehicles and each of the three most urban categories accounts for about 25 percent of the overall exposure. In California, however, the three most rural categories account for only 5 percent of the vehicle exposure, and the most urban category accounts for over 60 percent. Thus, California has a substantially higher proportion of its vehicle exposure in the most densely populated urban areas with high losses.

Figure 11 displays California and United States collision coverage average loss payments per insured vehicle year for 1985-87 model passenger cars by density category. This figure shows that, for the most part, collision coverage average loss payments per insured vehicle year for California and the United States increased with increasing urbanization. Within each density category, California's collision losses exceeded national losses.

Figure 12 gives California and the United States theft coverage average loss payments per insured vehicle year for 1985-87 model passenger cars by density category. For both California and the United States, the figure shows that theft average loss payments per insured vehicle year also increased with increasing urbanization. Within each density category, the national theft losses exceeded California's theft losses. Again the more urban category losses of California strongly affect California's overall theft result. Because of California's greater proportion of high density category exposure, the overall California and United States average loss payments per insured vehicle year are about the same — $24. This occurs even though the national theft losses exceeded the California theft losses in each density category.

Figure 13 shows the percentage of collision coverage exposure for small cars by density category in California and the United States. This figure is virtually identical to Figure 10 for all cars. Thus, California's small car losses will also be influenced by the high loss urban density category results.

Figure 10
Percentage of Collision Coverage Exposure By Density Category 1985-87 Models, California vs. U.S.

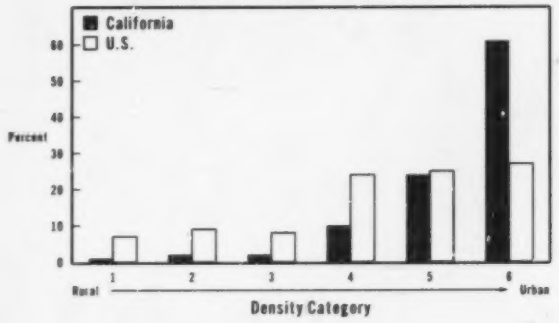


Figure 11
Collision Coverage Losses By Density Category 1985-87 Models, California vs. U.S.

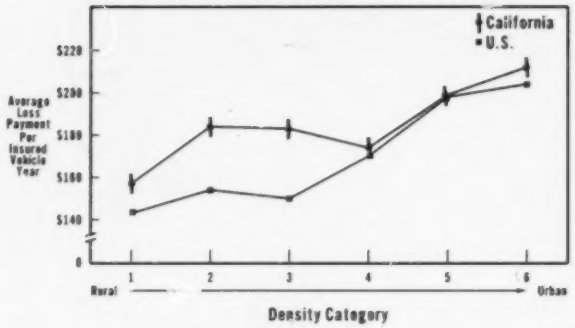


Figure 12
Theft Coverage Losses By Density Category 1985-87 Models, California vs. U.S.

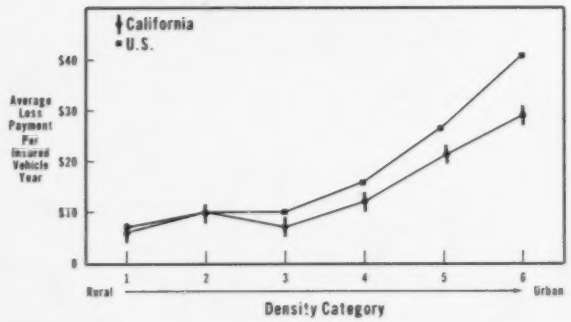
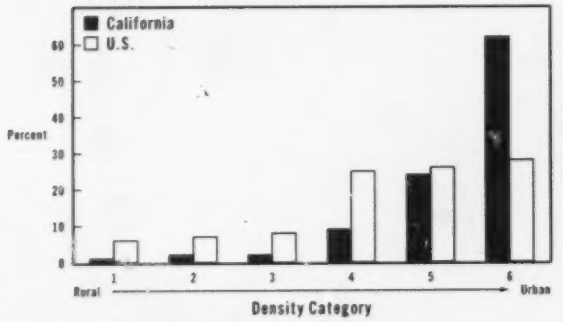


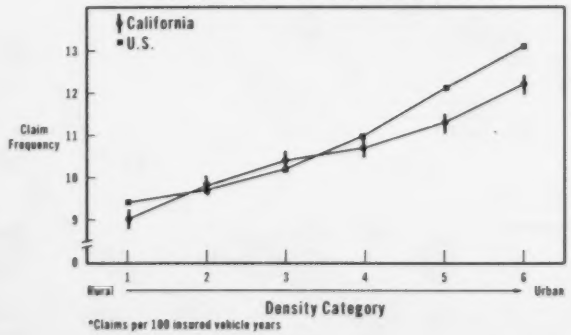
Figure 13
Percentage of Collision Coverage Exposure 1985-87 Model Small Cars, California vs. U.S.



Figures 14 and 15 present collision claim frequencies and average loss payments per insured vehicle year for small cars by density category in California and the United States. These results again show increased frequency and size of losses with increasing urbanization. Within a density category, California's average loss payment per insured vehicle year generally exceeded the national result. Also, California's losses for the more urban categories dominate the overall collision loss result for small cars.

Figures 16 and 17 present theft claim frequencies and average loss payments per insured vehicle year for small cars by density category in California and the United States. Both measures of theft loss increase with increased urbanization and within each density category California's result equaled or exceeded the national result.

Figure 14
Collision Claim Frequencies* By Density Category 1985-87 Model Small Cars, California vs. U.S.



*Claims per 100 insured vehicle years

Figure 15
Collision Coverage Losses By Density Category 1985-87 Model Small Cars, California vs. U.S.

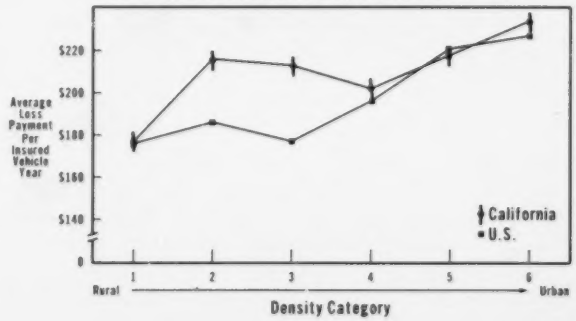
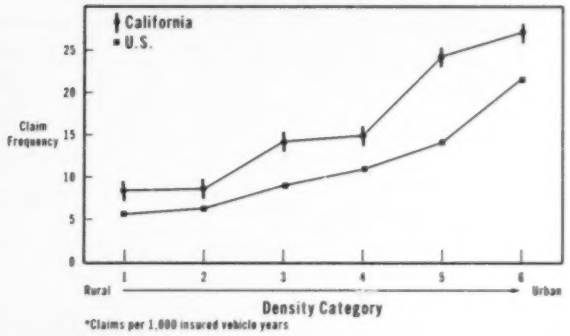


Figure 16

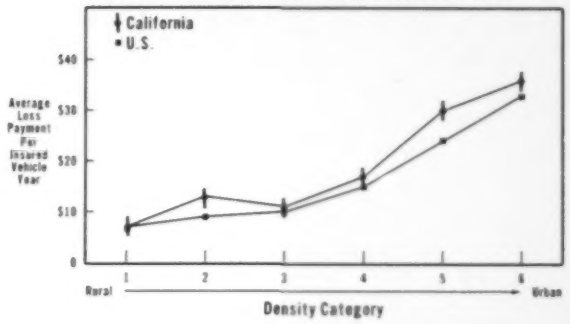
Theft Claim Frequencies* By Density Category
1985-87 Model Small Cars, California vs. U.S.



*Claims per 1,000 insured vehicle years

Figure 17

Theft Coverage Losses By Density Category
1985-87 Model Small Cars, California vs. U.S.



Individual Model Results

The preceding sections provided general information regarding insurance losses for California and the United States. The following tables further investigate differences between California and the entire United States based on sets of individual passenger vehicles having the best or worst results for a particular insurance coverage.

Table 2 shows the ten 1986 model passenger cars that had the worst collision results nationally. The Porsche 944 Coupe was the worst overall with a relative result of 267 compared to an average of 100 for all cars combined; in other words, this Porsche model had collision insurance losses that were more than two and one-half times the average for all 1986 models combined. The last column in this chart shows the relative numbers of these models as a proportion of the California collision coverage exposure compared to national proportions. In the table, 2.0 to 1 for the Porsche 944 Coupe indicates that the proportion of collision coverage exposure for Porsches in California is twice that of the national population. As indicated by this last column, in every case, in California there are proportionally more of the cars with the worst collision coverage results.

In contrast, Table 3 shows the ten 1986 model passenger cars that had the best collision results nationally. The Ford Crown Victoria two-door model and Pontiac Parisienne station wagon were the best overall with a relative result of 44 compared to an average of 100 for all cars combined; that is, these models had collision insurance losses less than half the average for all 1986 models combined. The last column in Table 3 gives relative numbers for these models as a proportion of the collision coverage exposure in California compared to the insured proportion nationally. In this table, 1 to 4.0 for the Pontiac Parisienne station wagon indicates that the proportion of these cars in the national population is four times that of the California population. Thus the table shows the cars with good collision coverage results generally comprise a smaller proportion of insured vehicles in California.

Tables 4 and 5 examine theft losses nationally and in California for the 10 models with the worst theft losses and the 10 models with the best theft losses. For five of the 10 models listed as having the worst results, there are proportionally more in California. For eight of the 10 models listed as having the best theft results, there are proportionally fewer in California.

Tables 6 and 7 examine personal injury protection losses for the 10 models with the worst injury claim frequencies and the 10 models with the best injury claim frequencies in states providing no-fault personal injury protection coverage. Although California does not offer this coverage, these tables present exposure data for cars that have demonstrated either very good or very poor injury losses in the no-fault states. These cars can be expected to have similarly good or poor injury loss experience in California even though the injury coverages are different. There are proportionally more vehicles in California for seven of the 10 models listed as having the worst injury results. Eight of the 10 models listed as having the best injury results are proportionally fewer in California.

The results in Tables 2 through 7 consistently demonstrate that, relative to the United States, higher loss models comprise a larger proportion in California and lower loss models comprise a smaller proportion in California.

Even the most popular cars in California have, on average, higher collision losses than the most popular cars on a national basis. Table 8 shows the five most popular cars in both California and the United States and their relative collision insurance losses. In this table, the third and fourth most popular cars in California — the Ford Thunderbird and the Toyota Celica — both have worse than average losses, whereas all of the five most popular cars nationally have below average losses. The weighted average for collision losses of the five most popular cars in California is nearly 20 percent higher than that of the five most popular cars nationally.

REFERENCES

1. *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Density, 1972 and 1973 Models.* HLDI Report A-2. Highway Loss Data Institute, Washington, D.C., September 1974.

2. *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Density, 1974 and 1975 Models.* HLDI Report A-4. Highway Loss Data Institute, Washington, D.C., December 1975.

3. *Relationships Between Losses and Vehicle Density, 1982-84 Models.* HLDI Report A-25. Highway Loss Data Institute, Washington, D.C., October 1985.

4. *Insurance Losses Based on Garaging Location, 1985-87 Models.* HLDI Report A-29. Highway Loss Data Institute, Washington, D.C., June 1988.

Table 2
1986 Models with the Worst Collision Results
Proportion of Insurance Exposure - California Relative to U.S.

Model	Relative Collision Result*	Exposure Ratio Calif. : U.S.**
Porsche 944 Coupe	267	2.0 : 1
Chevrolet Corvette Convertible	259	1.8 : 1
Plymouth Conquest	252	1.6 : 1
Mitsubishi Starion	247	2.4 : 1
Dodge Conquest	242	1.7 : 1
Porsche 911 Coupe	235	3.1 : 1
Volkswagen Scirocco	221	2.0 : 1
Mitsubishi Cordia	218	2.1 : 1
Chevrolet Corvette	213	2.2 : 1
Audi GT Coupe	212	1.3 : 1
All 1986 Models	100	

*Average Loss Payment per Insured Vehicle Year
**Percent of California collision coverage exposure relative to percent of U.S. collision coverage exposure.

Table 3
1986 Models with the Best Collision Results
Proportion of Insurance Exposure - California Relative to U.S.

Model	Relative Collision Result*	Exposure Ratio Calif. : U.S.**
Ford Crown Victoria - 2 Dr.	44	1 : 1.3
Pontiac Parisienne - SW	44	1 : 4.0
Mercury Grand Marquis - 2 Dr.	50	1 : 2.6
Ford LTD - SW	51	1 : 1.4
American Eagle - SW	51	1 : 2.6
Pontiac Parisienne - 4 Dr.	53	1 : 8.2
Plymouth Voyager - PV	54	1 : 1.3
Chevrolet Astro Van - PV	55	1 : 1.0
Dodge Caravan - PV	55	1 : 1.2
Mercury Grand Marquis - 4 Dr.	57	1 : 3.2
All 1986 Models	100	

*Average Loss Payment per Insured Vehicle Year
**Percent of California collision coverage exposure relative to percent of U.S. collision coverage exposure.

Table 4
1986 Models with the Worst Theft Results
Proportion of Insurance Exposure - California Relative to U.S.

Model	Relative Theft Result*	Exposure Ratio Calif. : U.S.**
Porsche 911 Coupe	1,649	3.1 : 1
Chevrolet Camaro	732	1.0 : 1
Volkswagen Cabriolet	651	4.7 : 1
Pontiac Firebird	625	0.7 : 1
Chevrolet Monte Carlo	508	0.3 : 1
Volkswagen GTI	496	2.2 : 1
Chevrolet Corvette	460	2.2 : 1
Volkswagen Quantum - 4 Dr.	434	0.8 : 1
Cadillac Brougham	402	0.7 : 1
Porshe 944 Coupe	338	2.0 : 1
All 1986 Models	100	

*Average Loss Payment per Insured Vehicle Year
**Percent of California collision coverage exposure relative to percent of U.S. collision coverage exposure.

Table 5
1986 Models with the Best Theft Results
Proportion of Insurance Exposure - California Relative to U.S.

Model	Relative Theft Result*	Exposure Ratio Calif. : U.S.**
Mercury Lynx - SW	7	1 : 1.5
Plymouth Voyager	10	1 : 1.3
Mercury Sable - SW	11	1 : 0.8
Ford Taurus - SW	11	1 : 1.0
Ford LTD - SW	11	1 : 1.4
Dodge Aries - SW	11	1 : 1.9
Dodge 600 - 4 Dr.	11	1 : 2.2
Mercury Marquis - 4 Dr.	12	1 : 1.8
Ford Escort - SW	13	1 : 1.8
Plymouth Reliant - SW	13	1 : 2.4
All 1986 Models	100	

*Average Loss Payment per Insured Vehicle Year
**Percent of California collision coverage exposure relative to percent of U.S. collision coverage exposure.

Table 6
1984-86 Models with the Worst Injury Loss Experience
Proportion of Insurance Exposure - California Relative to U.S.

Model	Relative Claim Frequencies by Claim Size				Exposure Ratio
	All	>$250	>$500	>$1,000	Calif. : U.S.***
Chevrolet Spectrum - 4 Dr.**	177	192	193		0.9 : 1
Hyundai Excel - 4 Dr.*	161				2.3 : 1
Mitsubishi Mirage**	158				3.2 : 1
Chevrolet Spectrum - 2 Dr.**	153	156			1.1 : 1
Chevrolet Sprint - 2 Dr.**	152				2.2 : 1
Nissan Pulsar	151	149	149	139	1.3 : 1
Mitsubishi Tredia	149	167			2.0 : 1
Chevrolet Chevette - 2 Dr.	149	155	153	155	0.2 : 1
Plymouth Colt - 4 Dr.**	145				1.7 : 1
Chevrolet Chevette - 4 Dr.	143	145	144	142	0.2 : 1

*1986 models only
**1985 and 1986 models only
***Percent of California collision coverage exposure relative to percent of U.S. collision coverage exposure.

Table 7
1984-86 Models with the Best Injury Loss Experience
Proportion of Insurance Exposure - California Relative to U.S.

Model	Relative Claim Frequencies by Claim Size				Exposure Ratio
	All	>$250	>$500	>$1,000	Calif. : U.S.*
Pontiac Parisienne - SW	52	47			1 : 4.0
Mercury Grand Marquis - SW	53	52			1 : 1.4
Oldsmobile Custom Cruiser	54	51	56		1 : 1.9
Buick Electra - SW	54				1 : 1.5
Mercury Grand Marquis - 2 Dr.	55	60			1 : 2.5
Jaguar XJ6	57	61			1 : 0.4
Volvo 240 - SW	58	57	55	50	1 : 0.4
Chevrolet Caprice - SW	60	55	55	57	1 : 2.0
Dodge Diplomat	61	59			1 : 3.2
Plymouth Voyager	63	59	53	51	1 : 1.3

*Percent of California collision coverage exposure relative to percent of U.S. collision coverage exposure.

Table 8
1986 Models with the Most Collision Insurance Coverage Exposure - California vs. U.S.

Model	Percent of Exposure	Collision Result*
	California	
Honda Accord - 4 Dr.	4.10	99
Toyota Camry - 4 Dr.	2.68	74
Ford Thunderbird	2.17	111
Toyota Celica	2.15	140
Toyota Corolla - 4 Dr.	1.89	90
Weighted Average		101
	United States	
Honda Accord - 4 Dr.	2.38	99
Oldsmobile Ciera - 4 Dr.	2.31	75
Chevrolet Celebrity - 4 Dr.	2.03	71
Ford Escort - 2 Dr.	1.97	97
Buick Century - 4 Dr.	1.88	82
Weighted Average		85

*Relative Average Loss Payment per Insured Vehicle Year.

APPENDIX A Standardization

Insurance loss experience varies in relation to certain nonvehicle factors. With respect to Personal Injury Protection (PIP) coverages, one important factor that influences loss experience is operator age. Youthful operators generally have worse loss experience than older drivers. Thus, the proportion of youthful operators must be taken into consideration in comparing the loss experience of different vehicles.

To remove any biases that could result because of variations among different vehicles in an operator age group, PIP coverage results for vehicles in this study were weighted, or standardized, to produce a weighted average of actual results. The weights used in the standardization procedure are shown below.

Operator Age Group	Distribution
Youthful	0.10
No Youthful	0.90

With respect to collision coverages, both the frequency and average size of collision losses vary with the deductible amount and the age group of the operators. Therefore, collision coverage results for the vehicles in this study were standardized using the weights shown below.

Deductible	Youthful Operator	No Youthful Operator
< $150	0.05	0.50
≥ $150	0.05	0.40

Similary, theft claim frequency and average size of theft losses were also standardized using the weights shown below.

Deductible	Youthful Operator	No Youthful Operator
= $0	0.05	0.50
≥ $0	0.05	0.40

Standardizing for the nonvehicle factors of age and deductible ensures that their mix is the same for each result. Therefore, to the extent that age distributions within each operator age group and amounts within each deductible group do not vary substantially for different vehicles, these effects will not bias comparisons among the various results.

The standardization procedure employed is widely used in health statistics.* The basic principle of the method is the introduction of a selected population with a standard distribution across operator age group or across the combination of operator age group and deductible, as represented by the standardization weights in the tables.

APPENDIX B Definitions

Average Loss Payment per Claim - The total of all loss payments made for the claims for a group of vehicles, divided by the number of claims paid and expressed as dollars per claim.

Average Loss Payment per Insured Vehicle Year - For a group of vehicles, the product of Claim Frequency and Average Loss Payment per Claim expressed as dollars per insured vehicle year. It should be noted that this definition differs from the commonly used insurance term, pure premium, but yields similar results.

Claim Frequency - The number of claims for a group of vehicles, divided by the exposure for that group.

Deductible Amount - That portion of the collision damage cost borne by the policyholder. For computing results, collision deductible amounts are split into two groups; less than $150 (mainly $50 and $100 deductibles) and greater than or equal to $150 (mainly $200 and $250 deductibles).

Exposure - The time interval an individual vehicle is insured. Exposure for a group of vehicles is expressed in units of insured vehicle years.

No Youthful Operator - For purposes of this report, all males and females (married or single) at least 25 years of age and all married females under 25 years of age.

Operator Age Group - The factor that distinguishes those vehicles whosed rated driver is youthful from those vehicles whose rated driver is not youthful (see Youthful and No Youthful Operator).

Passenger Vehicles - There are four major body style groupings of passenger vehicles—regular two-door models, regular four-door models, station wagons and passenger vans, and sports and specialty models. Sports and specialty models include all two-seater cars, all convertibles, all midsize and large cars with two or fewer designated rear seating positions, and all luxury cars. Each body style group is further divided into size class subgroups based on wheelbase (rounded to nearest inch) defined as follows:

Small - Vehicles with wheelbases less than or equal to 99 inches.

Midsize - Vehicles with wheelbases greater than 99 inches and less than or equal to 109 inches.

Large - Vehicles with wheelbases greater than 109 inches.

Personal Injury Protection Coverage - First party no-fault coverage in which an insurer pays, within the specified limits, the medical, hospital, and other expenses of the insured, others in his vehicle, and pedestrians struck by him.

Rated Driver - The driver considered to represent the greatest risk for the policy of an insured vehicle.

Youthful Operator - For the purposes of this report, all males (married or single) under 25 years of age and all unmarried females under 25 years of age.

*For example, see Armitage, P. *Statistical Methods in Medical Research*, Wiley, New York (1971).

HLDI Publications

Research reports published by the Highway Loss Data Institute are:

R72-1 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1972 Models,* June 1973.

R73-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1973 Models Compared with 1972 Models,* September 1973.

R73-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models,* March 1974.

R73-3 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models During Their First Two Years,* December 1974.

R73-4 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models During Their First Three Years,* December 1975.

R74-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1974 Models,* May 1974.

R74-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1974 Models During Their First Year,* December 1974.

R74-3 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1974 Models During Their First Two Years,* December 1975.

R75-1 *Automobile Insurance Losses, Collision Coverages, Initial Results for 1975 Models,* July 1975.

R75-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1975 Models During Their First Year,* December 1975.

R76-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1976 Models,* June 1976.

R76-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1976 Models During Their First Year, 1975 Models During Their First Two Years, 1974 Models During Their First Three Years,* December 1976.

R77-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1977 Models,* June 1977.

R77-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1977 Models During Their First Year, 1976 Models During Their First Two Years, 1975 Models During Their First Three Years,* December 1977.

R78-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1978 Models,* June 1978.

R78-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1978 Models During Their First Year, 1977 Models During Their First Two Years, 1976 Models During Their First Three Years,* January 1979.

R79-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1979 Models,* June 1979.

R79-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1979 Models During Their First Year, 1978 Models During Their First Two Years, 1977 Models During Their First Three Years,* December 1979.

R80-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1980 Models,* June 1980.

R80-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1980 Models During Their First Year, 1979 Models During Their First Two Years, 1978 Models During Their First Three Years,* December 1980.

R81-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1981 Models,* July 1981.

R81-2 *Insurance Losses, Collision Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1981 Models During Their First Year, 1980 Models During Their First Two Years, 1979 Models During Their First Three Years,* December 1981.

R82-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1982 Models,* July 1982.

R82-2 *Insurance Losses, Collision Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1982 Models During Their First Year, 1981 Models During Their First Two Years; 1980 Models During Their First Three Years,* December 1982.

R83-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1983 Models,* June 1983.

R83-2 *Insurance Losses, Collision Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1983 Models During Their First Year, 1982 Models During Their First Two Years, 1981 Models During Their First Three Years,* January 1984.

R84-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1984 Models,* June 1984.

R84-2 *Insurance Losses, Collision Coverages; Passenger Vehicles, Vans, Pickups, and Utility Vehicles; 1984 Models During Their First Year, 1983 Models During Their First Two Years, 1982 Models During Their First Three Years,* January 1985.

R85-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1985 Models,* July 1985.

R85-2 *Insurance Collision Report, Passenger Vehicles, Vans, Pickups, and Utility Vehicles, 1985 Models During Their First Year, 1984 Models During Their First Two Years, 1983 Models During their First Three Years,* January 1986.

R86-1 *Insurance Collision Report, Initial Results for 1986 Automobiles,* August 1986.

R86-2 *Insurance Collision Report, Passenger Cars, Vans, Pickups, and Utility Vehicles, 1986 Models During Their First Year, 1985 Models During Their First Two Years, 1984 Models During Their First Three Years* December 1986.

R87-1 *Insurance Collision Report, Initial Results for 1987 Automobiles,* July 1987.

R87-2 *Insurance Collision Report, Passenger Cars, Vans, Pickups, and Utility Vehicles, 1987 Models During Their First Year, 1986 Models During Their First Two Years, 1985 Models During Their First Three Years,* December 1987.

V78-1 *Automobile Insurance Losses, Non-Commercial Collision Coverages; Variations by Make and Series, Vans, Pickups and Utility Vehicles; 1978 Models During Their First Year, 1977 Models During Their First Two Years,* February 1979.

V79-1 *Automobile Insurance Losses, Non-Commercial Collisions Coverages; Variations by Make and Series, Vans, Pickups and Utility Vehicles; 1979 Models During Their First Year, 1978 Models During Their First Two Years,* April 1980.

V79-2 *Automobile Insurance Losses, Personal Injury Protection Coverages; Claim Frequency Results by Size of Claim for 1977, 1978, and 1979 Vans, Pickup Trucks, and Utility Vehicles,* October 1980.

V79-3 *Insurance Theft Losses; Vans, Pickups, and Utility Vehicles, 1979 Models,* May 1981.

V80-1 *Automobile Insurance Losses, Non-Commercial Collision Coverages; Variations by Make and Series, Vans, Pickups, and Utility Vehicles; 1980 Models During Their First Year, 1979 Models During Their First Two Years, 1978 Models During Their First Three Years,* December 1980.

V80-2 *Automobile Insurance Losses, Personal Injury Protection Coverages; Injury Claim Frequency Results by Size of Claim; Vans, Pickup Trucks, and Utility Vehicles, 1977-1980 Models,* September 1981.

I75-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974 and 1975 Models,* June 1976.

I75-2 *Automobile Insurance Losses, Percentage of Collision Claims with Associated Injury Claims for 1974 and 1975 Models,* March 1977.

I76-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974, 1975, and 1976 Models,* November 1977.

I76-2 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974, 1975, and 1976 Models,* September 1978.

I77-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1977 Models,* September 1978.

I78-1 *Automobile Insurance Losses, Personal Injury Protection Coverages; Claim Frequency Results for 1977 and 1978 Models,* September 1979.

I79-1 *Automobile Insurance Losses, Personal Injury Protection Coverages; Claim Frequency Results by Size of Claim for 1977, 1978, and 1979 Models,* October 1980.

I80-1 *Automobile Insurance Losses, Personal Injury Protection Coverages; Claim Frequency Results by Size of Claim; 1978-1980 Models,* September 1981.

I81-1 *Insurance Losses, Personal Injury Protection Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1979-1981 Models,* September 1982.

I82-1 *Insurance Losses, Personal Injury Protection Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1980-1982 Models,* September 1983.

I83-1 *Insurance Losses, Personal Injury Protection Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1981-1983 Models,* September 1984.

I84-1 *Insurance Losses, Personal Injury Protection Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1982-1984 Models,* August 1985.

I85-1 *Insurance Injury Report, Passenger Cars, Vans, Pickups, and Utility Vehicles; 1983-1985 Models,* August 1986.

I86-1 *Insurance Injury Report, Passenger Cars, Vans, Pickups, and Utility Vehicles; 1984-1986 Models,* August 1987.

A-1 *Automobile Insurance Losses, Collision Coverages; A Comparison of Results for 1972 and 1973 Models,* May 1974.

A-2 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Density, 1972 and 1973 Models,* September 1974.

A-3 *Automobile Insurance Losses, Collision Coverages; A Comparison of Results for 1973, 1974 and 1975 Models,* July 1975.

A-4 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Density, 1974 and 1975 Models,* December 1975.

A-5 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Body Style, 1974 and 1975 Models,* December 1975.

A-6 *Automobile Insurance Losses, Collision Coverages; An Investigation of Relationships Between Losses and Engine Specifications, Using 1973 Models,* June 1976.

A-7 *Automobile Insurance Losses, Collision Coverages; Annual Increases and Seasonal Variations 1972, 1973, 1974 and 1975 Models,* June 1976.

A-8 *Automobile Insurance Losses, Injury Coverages; A Preliminary Comparison of Results for Volkswagen Rabbits with Passive and Active Seat Belts, 1975 and 1976 Models,* June 1977.

A-9 *Automobile Insurance Losses, Collision Coverages; A Comparison of Collision Claim Size Distributions for 1974, 1975, and 1976 Models,* November 1977.

A-10 *Automobile Insurance Losses, Injury Coverages; Comparisons of Claim Frequencies of Volkswagen Rabbits with Automatic and Manual Seat Belts, 1975, 1976, and 1977 Models,* June 1979.

A-11 *Automobile Insurance Losses, Collision Coverages; The Consistency of the Loss Experience of Specific Vehicles Produced in Several Years, 1975 to 1978 Models,* June 1979.

A-12 *Automobile Insurance Losses, Collision Coverages; An Assessment of the Effects of the Federal Safety Bumper Standard on the Losses, 1972 Through 1978 Models,* June 1980.

A-13 *Automobile Insurance Losses, Personal Injury Protection and Collision Coverages; The Effects of Car Size on Crash Losses, 1977-1980 Models,* May 1981.

A-14 *Automobile Insurance Losses, Personal Injury Protection and Collision Coverages; Comparisons of the Loss Experience of Two- and Four-Door Cars, 1978, 1979, and 1980 Models,* June 1981.

A-15 *Automobile Insurance Losses, Personal Injury Protection and Collision Coverages; Relationships Between Injury and Collision Losses and Engine Options for Selected 1977-1979 Compact Cars,* June 1981.

A-16 *Automobile Insurance Losses, Collision Coverages; The Frequency of Claims Involving Salvage; Subcompact and Compact Cars; 1980 Models,* January 1982.

A-17 *Insurance Losses, Comprehensive Coverages; Non-Crash Fire Losses; 1979-1980 Models,* February 1982.

A-18 *Insurance Losses, Theft Coverages; The Distribution of Theft Loss Payment Amounts; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1981 Models During Their First Year, 1980 Models During Their First Two Years; 1979 Models During Their First Three Years,* June 1982.

A-19 *Insurance Losses, Theft Coverages; A Comparison of the Theft Loss Experience of General Motors Passenger Cars With and Without Factory-Installed Theft Deterrent Systems; 1980-1981 Models,* January 1983.

A-20 *Insurance Losses, Collision Coverages, A Comparison of the Collision Loss Experience of Subaru Models with 5 and 2.5 MPH Bumpers,* April 1983.

A-21 *Insurance Losses, Personal Injury Protection Coverages, Injury Claim Frequencies for Volkswagen Rabbits with Automatic and Manual Seat Belts, 1981 and 1982 Models,* April 1984.

A-22 *Insurance Losses, Collision Coverages, An Analysis of Salvage Credits, 1977 Through 1982 Model Year Cars,* July 1984.

A-23 *Injury and Collision Losses by Engine Option, Selected 1983 Models,* October 1985.

A-24 *Comparison of the Insurance Loss Experience of Unibody and Frame Construction Cars After a Collision Repair, 1981-82 Models,* October 1985.

A-25 *Relationships Between Losses and Vehicle Density, 1982-84 Models,* October 1985.

A-26 *Consistency of Model Year Injury Claim Frequency Results for Selected 1981-1983 Models,* May 1986.

A-27 *A Preliminary Evaluation of New York and New Jersey Insurance Injury Claim Results Before and After Enactment of Mandatory Seat Belt Legislation; 1983-85 Models,* May 1986.

A-28 *Insurance Injury Loss Experience in Eight States with Seat Belt Laws, 1983-86 Models,* 1988 in press.

A-29 *Insurance Losses Based on Garaging Location, 1985-87 Models,* 1988 in press.

A-30 *Automobile Insurance Losses, A Comparison of California and National Results,* May 1988.

T79-1 *Automobile Insurance Theft Losses by Make and Series; 1979 Models,* June 1980.

T80-1 *Automobile Insurance Theft Losses by Make and Series; 1979 and 1980 Models,* April 1981.

T81-1 *Insurance Losses, Theft Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1981 Models During Their First Year, 1980 Models During Their First Two Years, 1979 Models During Their First Three Years,* May 1982.

T82-1 *Insurance Losses, Theft Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1982 Models During Their First Year, 1981 Models During Their First Two Years, 1980 Models During Their First Three Years,* May 1983.

T83-1 *Insurance Losses, Theft Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1983 Models During Their First Year, 1982 Models During Their First Two Years, 1981 Models During Their First Three Years,* May 1984.

T84-1 *Insurance Losses, Theft Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1984 Models During Their First Year, 1983 Models During Their First Two Years, 1982 Models During Their First Three Years,* March 1985.

T85-1 *Insurance Theft Report; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1985 Models During Their First Year, 1984 Models During Their First Two Years, 1983 Models During Their First Three Years,* April 1986.

T86-1 *Insurance Theft Report; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1986 Models During Their First Year, 1985 Models During Their First Two Years, 1984 Models During Their First Three Years,* May 1987.

T87-1 *Insurance Theft Report; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1987 Models During Their First Year, 1986 Models During Their First Two Years, 1985 Models During Their First Three Years,* April 1988.

A5200-4,20-F

INSURANCE SPECIAL REPORT

Insurance Losses Based on Garaging Location
1985-87 Models

Highway Loss Data Institute

A-29

Highway Loss Data Institute
Insurance Special Report

Insurance Losses Based on Garaging Location
1985-87 Models
HLDI A-29

Permission to quote from or to reproduce material from this publication is granted when due acknowledgement is made.
Highway Loss Data Institute — Watergate Six Hundred — Washington, D.C. 20037
Research Report HLDI A-29; June 1988
© 1988/HLDI

The membership of the Highway Loss Data Institute Board of Directors and the Technical Resource Committee represents insurance companies that are supplying data to HLDI. Financial support for HLDI is provided through the Insurance Institute for Highway Safety, which in turn is supported by most automobile insurers either directly or through their trade associations.

Board of Directors

J. B. Conners, Chairman
Liberty Mutual Insurance Company

M. Albaum
Prudential Property and Casualty Insurance Company

C. A. Bryan
United Services Automobile Association

E. Gottheim
Government Employees Insurance Company

G. Jerabek
Nationwide Mutual Insurance Company

G. C. Klingman
The Travelers Insurance Companies

R. S. Lawson
Alliance of American Insurers

A. Longley-Cook
Aetna Life and Casualty

D. Snyder
American Insurance Association

W. W. Sorenson
State Farm Mutual Automobile Insurance Company

J. S. Trees
Allstate Insurance Company

T. E. Troxel
National Association of Independent Insurers

B. O'Neill, ex officio
Highway Loss Data Institute

Technical Resource Committee

M. Albaum, Chairman
Prudential Property and Casualty Insurance Company

C. A. Bryan
United Services Automobile Association

R. O. Elder
Highway Loss Data Institute

E. Gottheim
Government Employees Insurance Company

G. Jerabek
Nationwide Mutual Insurance Company

G. C. Klingman
The Travelers Insurance Companies

A. Longley-Cook
Aetna Life and Casualty

R. Muleski
Liberty Mutual Insurance Company

B. O'Neill
Highway Loss Data Institute

W. W. Sorenson
State Farm Mutual Automobile Insurance Company

J. S. Trees
Allstate Insurance Company

CONTENTS

1 **Summary**
2 **Introduction**
3 **Results and Discussion**
3 Passenger Car Results by Size Class
4 Collision Results by Size Class and Body Style
9 **Appendix A**
9 Table A-1 U.S. Department of Agriculture Rural-Urban Continuum Classification System
9 Table A-2 Collision Average Loss Payment Per Claim by Garaging Location and Size Class — 1985-87 Model Passenger Cars
9 Table A-3 Theft Average Loss Payment Per Claim by Garaging Location and Size Class — 1985-87 Model Passenger Cars
9 **Appendix B** Standardization
10 **Appendix C** Definitions
11 **HLDI Publications**

2 **Figure 1** Collision Coverage Claim Frequencies
2 **Figure 2** Collision Coverage Average Loss Payment Per Insured Vehicle Year
3 **Figure 3** Comprehensive Coverage Theft Claim Frequencies
3 **Figure 4** Comprehensive Coverage Theft Average Loss Payment Per Insured Vehicle Year
4 **Figure 5** Personal Injury Protection Coverage Overall Injury Claim Frequencies
4 **Figure 6** Personal Injury Protection Coverage Claim Frequencies For Injury Claims Above $1000
3 **Table 1** Rural-Urban Garaging Location Categories
5 **Table 2** Collision Claim Frequency by Garaging Location for Size Class and Body Style
6 **Table 3** Collision Average Loss Payment Per Claim by Garaging Location for Size Class and Body Style
6 **Table 4** Collision Average Loss Payment Per Insured Vehicle Year by Garaging Location for Size Class and Body Style
7 **Table 5** Theft Claim Frequency by Garaging Location for Size Class and Body Style
7 **Table 6** Theft Average Loss Payment Per Claim by Garaging Location for Size Class and Body Style
8 **Table 7** Theft Average Loss Payment Per Insured Vehicle Year by Garaging Location for Size Class and Body Style
8 **Table 8** Personal Injury Protection Coverage — All Injury Claim Frequency by Garaging Location for Size Class and Body Style

SUMMARY

This Highway Loss Data Institute special report examines passenger car insurance collision losses, theft losses, and first-party medical losses in states with no-fault insurance in relation to their normal garaging locations. The report summarizes the frequency and severity of collision, theft, and injury claims for vehicles assigned to garaging location categories based on population density classifications developed by the U.S. Department of Agriculture. This classification system produces a rural-urban continuum. The results, based on the loss experience of 1985-87 models, are presented by size class and body style for passenger cars.

Principal Findings

Passenger Car Results by Size Class

- Collision claim frequencies and average loss payments per insured vehicle year increased with increasing urbanization. This pattern was consistent for all car size groups.
- The collision results also displayed a substantial vehicle size effect. In general, for each garaging location, small cars had the highest claim frequency, highest average loss payment per claim, and highest average loss payment per insured vehicle year, and large cars had the lowest results.
- Theft claim frequencies increased with increasing urbanization. Regardless of garaging location, vehicle size had little effect on theft claim frequency.
- Average loss payments per insured vehicle year for theft increased with increasing urbanization. In the most urban garaging locations, large passenger cars had the highest average loss payments per insured vehicle year, and small passenger cars had the lowest. For the other garaging locations, vehicle size had little effect on theft results.
- Regardless of passenger car size class, frequencies for all injury claims tended to increase with increasing urbanization. The injury results also displayed a substantial vehicle size effect: For each garaging location, small cars had the highest injury claim frequency and large cars had the lowest. Noteworthy among these results, the injury claim frequency for small cars in the most rural garaging locations was substantially larger than the injury claim frequency for large cars in the most urban garaging locations.
- For injury claims over $1,000, claim frequencies increased sharply for the two most urban garaging locations. These results also show a substantial vehicle size effect; however, the injury claim frequency for small cars in the most rural garaging locations was comparable to that for the large cars in the most urban garaging locations.

Passenger Car Results by Size Class and Body Style

- Generally, in all garaging location categories and for all body style groups, collision claim frequencies, average loss payments per claim, and average loss payments per insured vehicle year decreased with increasing car size.
- For all car sizes and body styles, collision claim frequencies and average loss payments per insured vehicle year tended to increase with increasing urbanization.
- For all car sizes and body styles, theft claim frequencies and average loss payments per insured vehicle year tended to increase with increasing urbanization.
- Injury claim frequencies generally increased with increasing urbanization and decreased with increasing vehicle size.

INTRODUCTION

The Highway Loss Data Institute (HLDI) is a nonprofit, public service organization that gathers, processes, and publishes insurance data concerning the human and economic losses associated with motor vehicles.

In previous reports, HLDI has investigated the effect of vehicle density (the number of registered cars per square mile) on insurance losses. In its first two reports on this topic, HLDI concluded that collision coverage claim frequencies for 1972-73 models and 1974-75 models generally increased with increasing vehicle density but that average loss payments per claim decreased with increasing vehicle density.[1,2] The studies also concluded that the influence of vehicle density on the frequency and size of collision claims was consistent for each of the four car size classes (subcompact, compact, intermediate, and full-size) considered at that time. In a later report, HLDI examined collision losses of 1982 models and injury losses of 1982-84 models.[3] That study showed that collision claim frequencies for passenger cars increased with increasing vehicle density for each car size group (small, midsize, and large), average loss payments per claim remained relatively constant as vehicle density increased, and average loss payments per insured vehicle year increased with increasing vehicle density. Injury claim frequencies also increased as vehicle density increased for each of the passenger car size groups.

This report examines the influence of vehicle garaging location on the collision, theft, and injury losses of 1985-87 model year passenger cars.* The results are based on coverage and loss data submitted through September 1987 and supplied by the following insurers: Aetna, Allstate, Fireman's Fund, GEICO, Liberty Mutual, Prudential, Sentry, State Farm, and Travelers.

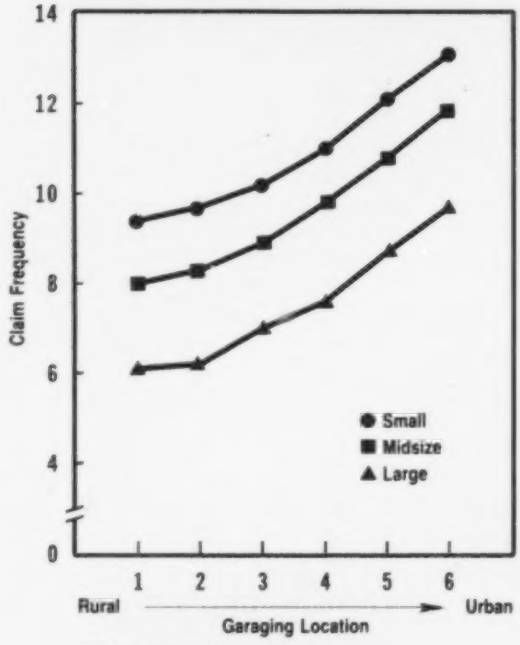
Method of Data Analysis

The United States Department of Agriculture (USDA) has developed a population density classification scheme that assigns U.S. counties to one of 10 rural-urban categories.** For this report, the USDA classification scheme was used as the basis for defining rural and urban garaging location categories. Each vehicle in the HLDI data base was assigned to one of the 10 USDA categories by matching the zip-code of the vehicle's garaging location with its appropriate county code. To reduce the number of categories for this analysis, the USDA nonmetropolitan categories were combined into two classes of counties, those adjacent to a metropolitan area and those not adjacent to a metropolitan area. Table 1 specifies the six rural-urban garaging location categories used for this analysis.

* Injury results were standardized to minimize effects due to operator age groups. Collision and theft results were standardized to minimize effects due to operator age groups and deductible amounts.

** See Appendix A for USDA classification scheme.

Figure 1
Collision Coverage Claim Frequencies* 1985-87 Passenger Cars by Size Class



*Claims per 100 insured vehicle years

Figure 2
Collision Coverage Average Loss Payment Per Insured Vehicle Year, 1985-87 Passenger Cars by Size Class

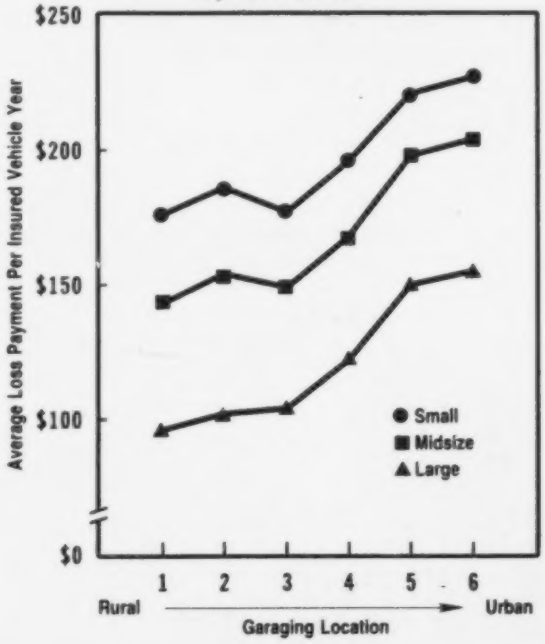


Table 1 Rural-Urban Garaging Location Categories	
Category	**Definition**
	Nonmetropolitan Counties
1	Nonmetropolitan counties not adjacent to a metropolitan area
2	Nonmetropolitan counties adjacent to a metropolitan area
	Metropolitan Counties
3	Counties in metropolitan areas of less than 250,000 population
4	Counties in metropolitan areas of 250,000 to 1,000,000 population
5	Fringe counties of metropolitan areas of 1,000,000 population or more
6	Central counties of metropolitan areas of 1,000,000 population or more

Source: Based on USDA Rural-Urban Continuum Classification System.

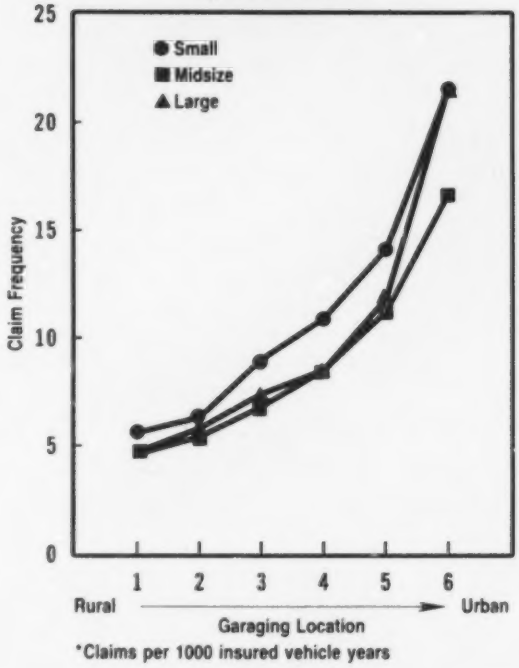
RESULTS AND DISCUSSION

Passenger Car Results by Size Class

Figures 1 and 2 present 1985-87 model collision coverage claim frequencies (per 100 insured vehicle years) and average loss payments per insured vehicle year for all small, midsize, and large passenger cars. In general, collision claim frequencies and average loss payments per insured vehicle year increased with increasing urbanization. This pattern was consistent for each passenger car size class. The collision results also displayed a substantial vehicle size effect; that is, within each garaging location category, small passenger cars had the highest claim frequency and highest average loss payment per insured vehicle year, and large cars had the lowest claim frequency and lowest average loss payment per insured vehicle year. (The average loss payments per claim associated with the insurance losses of Figures 1 and 2 do not exhibit a consistent relationship with the urbanization categories. However, the vehicle size effect does exist for these results. For completeness, Appendix Table A-2 provides the average loss payments per claim.)

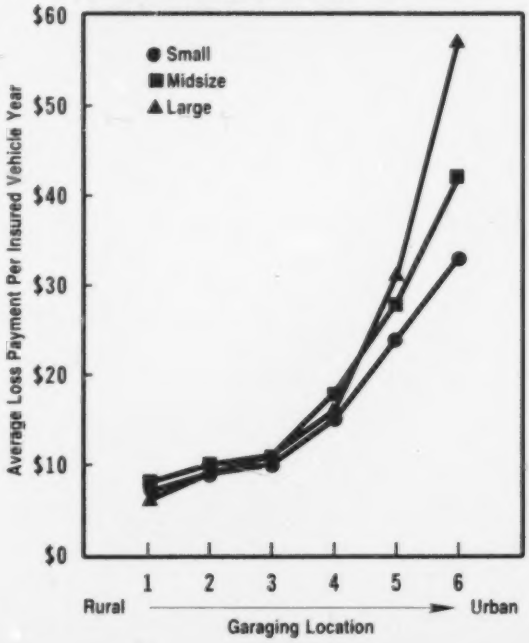
Figures 3 and 4 present theft claim frequencies (per 1,000 insured vehicle years) and average loss payments per insured vehicle year for passenger cars by size class. Similar to collision, theft claim frequencies and average loss payments per insured vehicle year increased with increasing urbanization. In general, vehicle size had little effect on the theft results. Differences in average loss payments per insured vehicle year among small, midsize, and large cars were most pronounced in the two most urban garaging categories. For those two categories, large cars had the highest theft losses and small cars the lowest. (Average loss payments per claim associated

Figure 3
Comprehensive Coverage Theft Claim Frequencies*, 1985-87 Passenger Cars by Size Class



*Claims per 1000 insured vehicle years

Figure 4
Comprehensive Coverage Theft Average Loss Payment Per Insured Vehicle Year 1985-87 Passenger Cars by Size Class



with the results of Figures 3 and 4 are presented in Appendix Table A-3. For each size class, these averages were highest for the two most urban garaging categories.)

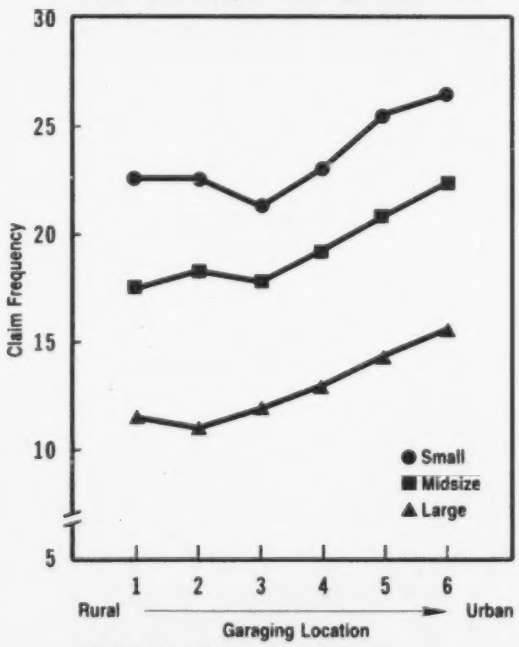
Figures 5 and 6 present the frequency of personal injury protection claims (per 1,000 insured vehicle years) by car size for all injury claims and for injury claims with medical costs exceeding $1,000. For both sets of injury claims, the claim frequencies tended to increase with increasing urbanization. For injury claims over $1,000, the claim frequencies increased sharply for the two most urban garaging locations. The injury claim frequencies also displayed a substantial vehicle size effect: Small cars had the highest injury claim frequencies and large cars the lowest injury claim frequencies regardless of garaging area. Noteworthy among these results, the overall injury claim frequency for small cars in the most rural garaging location was substantially larger than the overall injury claim frequency for large cars in the most urban garaging location. For injury claims over $1,000, the claim frequency for small cars in the most rural areas was comparable to the claim frequency for large cars in the most urban areas.

Collision Results by Size Class and Body Style

Tables 2 through 4 provide collision claim frequencies, average loss payments per claim, and average loss payments per insured vehicle year with respect to garaging location category, size class, and body style. Tables 2 through 4 indicate that there is a strong relationship between vehicle size and collision losses. Almost universally, in all garaging location categories and for all body style groups, collision claim frequencies, average loss payments per claim, and average loss payments per insured vehicle year decreased with increasing car size. Although still present, this relationship is least pronounced between small and midsize sports and specialty models. Tables 2 and 4 also indicate a fairly consistent pattern of increased collision losses with increasing urbanization. The average loss payments per claim (Table 3) do not exhibit this relationship. In addition, within each garaging location category, claim frequencies and average loss payments per insured vehicle year of the small and midsize cars increased according to the following sequence of body styles — station wagons, four-door models, two-door models, and sports and specialty models. The results for large cars do not display the same sequence.

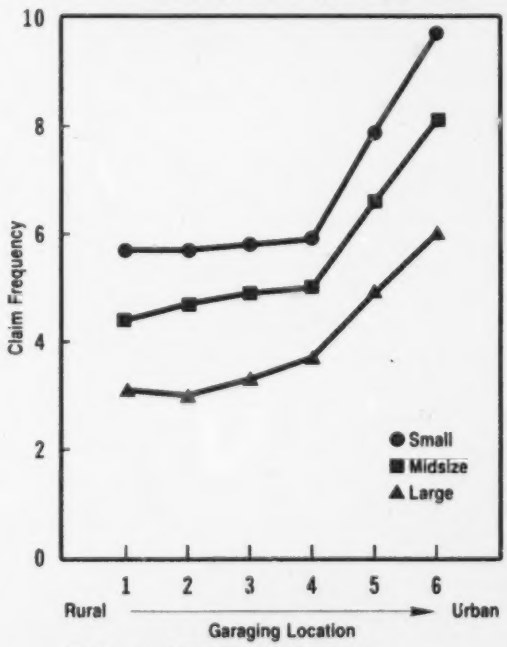
Tables 5 through 7 provide theft claim frequencies, average loss payments per claim, and average loss payments per insured vehicle year by garaging location category, size class, and body style. The relationship between insurance losses and urbanization noted for collision coverages is even more obvious for theft results. Claim frequencies and average loss payments per insured vehicle year for the most urban garaging location areas (category 6) are three to nine times the corresponding theft results of the most rural garaging location areas (category 1). Similar vehicle size relationships are not

Figure 5
Personal Injury Protection Coverage
Overall Injury Claim Frequencies*
1985-87 Passenger Cars by Size Class



*Claims per 1000 insured vehicle years

Figure 6
Personal Injury Protection Coverage Claim
Frequencies For Injury Claims Above $1000
1985-87 Passenger Cars by Size Class



*Claims per 1000 insured vehicle years

present in the theft data. For the most part, theft claim frequencies and average loss payments per insured vehicle year are smallest for station wagons, increase progressively for four-door models and two-door models, and then jump dramatically for sports and specialty models. Table 6 provides average loss payments per claim. In general, within size class, the average loss payments per claim for the specified body styles were highest for the two most urban categories.

Table 8 presents overall injury claim frequencies for personal injury protection coverage by garaging location, size class, and body style. These results are similar to the collision coverage results; both an urbanization and a size class relationship exist. Again, the size relationship is not as strong between small and midsize sports and specialty models as it is for the other body style groups.

REFERENCES

1. *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Density, 1972 and 1973 Models.* HLDI Report A-2. Highway Loss Data Institute, Washington, D.C., September 1974.

2. *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Density, 1974 and 1975 Models.* HLDI Report A-4. Highway Loss Data Institute, Washington, D.C., December 1975.

3. *Relationships Between Losses and Vehicle Density, 1982-84 Models.* HLDI Report A-25. Highway Loss Data Institute, Washington, D.C., October 1985.

TABLE 2: Collision Claim Frequency* by Garaging Location for Size Class and Body Style — 1985-87 Model Passenger Cars

Garaging Location Category		2-Door	4-Door	Station Wagons and Vans	Sports and Specialty
			Small Cars		
Rural	1	10.4	8.4	7.6	12.0
	2	10.6	8.9	8.0	11.9
↓	3	10.9	9.4	8.7	12.1
	4	11.8	10.2	9.2	12.6
	5	12.9	11.4	10.2	13.3
Urban	6	13.8	12.7	11.0	14.0
			Midsize Cars		
Rural	1	8.7	7.1	6.4	10.8
	2	8.7	7.5	7.3	11.3
↓	3	9.3	8.2	7.6	11.5
	4	10.2	9.0	8.2	12.1
	5	11.3	10.1	9.0	13.0
Urban	6	12.5	11.3	10.1	13.6
			Large Cars		
Rural	1	5.8	5.9	6.5	6.2
	2	5.7	6.1	6.5	6.7
↓	3	6.6	6.8	7.4	7.1
	4	7.5	7.5	7.7	8.0
	5	8.9	8.5	8.3	9.6
Urban	6	9.9	9.6	9.0	10.2

*Per 1,000 insured vehicle years.

TABLE 3: Collision Average Loss Payment Per Claim by Garaging Location for Size Class and Body Style — 1985-87 Model Passenger Cars

Garaging Location Category		2-Door	4-Door	Station Wagons and Vans	Sports and Specialty
			Small Cars		
Rural	1	$1,905	$1,715	$1,610	$2,430
	2	1,927	1,760	1,602	2,586
↓	3	1,763	1,597	1,428	2,216
	4	1,780	1,661	1,554	2,208
	5	1,818	1,700	1,602	2,270
Urban	6	1,720	1,650	1,536	2,066
			Midsize Cars		
Rural	1	$1,791	$1,659	$1,533	$2,249
	2	1,877	1,729	1,653	2,368
↓	3	1,628	1,583	1,444	2,029
	4	1,684	1,633	1,607	2,022
	5	1,767	1,710	1,641	2,195
Urban	6	1,614	1,633	1,617	2,059
			Large Cars		
Rural	1	$1,522	$1,604	$1,343	$1,932
	2	1,521	1,618	1,428	2,011
↓	3	1,440	1,499	1,318	1,717
	4	1,535	1,582	1,350	1,923
	5	1,669	1,636	1,471	2,041
Urban	6	1,480	1,537	1,358	1,919

TABLE 4: Collision Average Loss Payment Per Insured Vehicle Year by Garaging Location for Size Class and Body Style — 1985-87 Model Passenger Cars

Garaging Location Category		2-Door	4-Door	Station Wagons and Vans	Sports and Specialty
			Small Cars		
Rural	1	$198	$144	$123	$293
	2	204	157	129	309
↓	3	193	150	124	269
	4	210	169	143	279
	5	234	194	163	302
Urban	6	237	210	169	289
			Midsize Cars		
Rural	1	$156	$118	$ 98	$242
	2	164	129	120	269
↓	3	151	129	110	234
	4	171	147	133	245
	5	200	173	147	285
Urban	6	201	185	163	279
			Large Cars		
Rural	1	$ 88	$ 94	$ 87	$120
	2	86	98	93	135
↓	3	94	101	98	122
	4	116	117	103	154
	5	148	139	122	196
Urban	6	146	148	123	196

TABLE 5: Theft Claim Frequency* by Garaging Location for Size Class and Body Style — 1985-87 Model Passenger Cars

Garaging Location Category		2-Door	4-Door	Station Wagons and Vans	Sports and Specialty
			Small Cars		
Rural	1	6.7	4.4	2.2	11.6
	2	6.9	5.5	3.4	11.2
↓	3	9.9	7.7	4.8	13.8
	4	11.2	9.7	5.3	18.1
	5	13.7	14.0	6.3	21.4
Urban	6	20.9	21.6	11.3	30.7
			Midsize Cars		
Rural	1	4.1	3.6	3.3	11.9
	2	5.1	4.1	3.1	13.5
↓	3	6.6	5.0	4.4	15.3
	4	8.1	5.9	4.7	19.9
	5	9.8	8.5	5.1	24.4
Urban	6	17.1	13.0	7.7	31.1
			Large Cars		
Rural	1	4.1	4.4	3.3	8.8
	2	6.0	5.2	3.5	12.1
↓	3	6.6	6.3	5.3	13.6
	4	7.7	7.1	5.2	16.6
	5	7.8	9.9	6.3	21.8
Urban	6	20.0	19.2	9.6	35.9

*Per 1,000 insured vehicle years.

TABLE 6: Theft Average Loss Payment Per Claim by Garaging Location for Size Class and Body Style — 1985-87 Model Passenger Cars

Garaging Location Category		2-Door	4-Door	Station Wagons and Vans	Sports and Specialty
			Small Cars		
Rural	1	$1,076	$ 944	$ 880	$2,665
	2	1,129	1,095	1,271	2,947
|	3	941	840	1,261	1,930
	4	1,061	970	1,216	2,522
	5	1,399	1,135	1,185	3,400
Urban	6	1,352	1,140	1,398	2,811
			Midsize Cars		
Rural	1	$2,320	$ 715	$ 726	$2,756
	2	2,097	1,017	674	3,003
|	3	1,627	1,162	670	2,217
	4	2,377	1,276	798	2,713
	5	3,182	1,629	1,082	2,969
Urban	6	3,043	1,703	1,252	3,087
			Large Cars		
Rural	1	$1,596	$1,150	$ 805	$1,609
	2	1,192	1,186	755	2,561
|	3	1,758	1,764	995	1,431
	4	1,812	1,760	1,194	2,180
	5	2,136	2,203	1,386	3,216
Urban	6	2,569	2,419	1,518	2,991

TABLE 7: Theft Average Loss Payment Per Insured Vehicle Year by Garaging Location for Size Class and Body Style — 1985-87 Model Passenger Cars

Garaging Location Category		2-Door	4-Door	Station Wagons and Vans	Sports and Specialty
			Small Cars		
Rural	1	$ 7	$ 4	$ 2	$ 31
	2	8	6	4	33
	3	9	7	6	27
	4	12	9	6	46
	5	19	16	7	73
Urban	6	28	25	16	86
			Midsize Cars		
Rural	1	$10	$ 3	$ 2	$ 33
	2	11	4	2	41
	3	11	6	3	34
	4	19	8	4	54
	5	31	14	5	72
Urban	6	52	22	10	96
			Large Cars		
Rural	1	$ 7	$ 5	$ 3	$ 14
	2	7	6	3	31
	3	12	12	5	19
	4	14	13	6	36
	5	17	22	9	70
Urban	6	51	46	15	107

TABLE 8: Personal Injury Protection Coverage — All Injury Claim Frequency* by Garaging Location for Size Class and Body Style — 1985-87 Model Passenger Cars

Garaging Location Category		2-Door	4-Door	Station Wagons and Vans	Sports and Specialty
			Small Cars		
Rural	1	25.4	21.4	17.2	22.7
	2	25.1	21.7	17.5	22.0
	3	22.5	21.8	15.6	19.1
	4	25.0	23.1	17.6	20.7
	5	27.1	25.9	20.9	22.8
Urban	6	27.0	27.8	21.2	23.1
			Midsize Cars		
Rural	1	19.2	16.2	14.3	20.8
	2	21.0	17.0	14.1	23.0
	3	19.0	17.1	13.1	20.4
	4	20.3	18.7	16.0	21.0
	5	22.5	19.7	17.0	22.7
Urban	6	24.0	21.7	18.1	22.9
			Large Cars		
Rural	1	—	11.6	11.6	11.1
	2	—	11.4	10.7	9.2
	3	—	12.4	12.2	10.4
	4	13.2	13.4	12.3	13.0
	5	14.9	15.1	13.0	14.7
Urban	6	16.0	16.1	13.7	16.2

*Per 1,000 insured vehicle years.
— Insufficient exposure data to report claim frequency.

APPENDIX A

Appendix Table A-1
U.S. Department of Agriculture
Rural-Urban Continuum Classification System

Code	
	Metropolitan Counties
0	Central counties of metropolitan areas of 1 million population or more
1	Fringe counties of metropolitan areas of 1 million population or more
2	Counties in metropolitan areas of 250,000 to 1 million population
3	Counties in metropolitan areas of less than 250,000 population
	Nonmetropolitan Counties
4	Urban population of 20,000 or more, adjacent to metropolitan area
5	Urban population of 20,000 or more, not adjacent ot a metropolitan area
6	Urban population of less than 20,000, adjacent to a metropolitan area
7	Urban population of less than 20,000, not adjacent to a metropolitan area
8	Completely rural, adjacent to a metropolitan area
9	Completely rural, not adjacent to a metropolitan area

Note: Metropolitan status is that announced by the Office of Management and Budget in June 1983, when the current population criteria were first applied to results of the 1980 Census. Adjacency was determined by physical boundary adjacency and a finding that at least 2 percent of the employed labor force in the nonmetropolitan county commuted to metropolitan central counties.

Prepared in Economic Development Division, Economic Research Service, USDA.

Appendix Table A-2
Collision Average Loss Payment Per Claim by Garaging Location and Size Class — 1985-87 Model Passenger Cars

Garaging Location Category		Size Class		
		Small	Midsize	Large
Rural	1	$1,878	$1,790	$1,591
	2	1,911	1,880	1,630
	3	1,731	1,675	1,485
	4	1,779	1,723	1,598
	5	1,821	1,826	1,716
Urban	6	1,727	1,704	1,609

Appendix Table A-3
Theft Average Loss Payment Per Claim by Garaging Location and Size Class — 1985-87 Model Passenger Cars

Garaging Location Category		Size Class		
		Small	Midsize	Large
Rural	1	$1,312	$1,739	$1,252
	2	1,429	1,944	1,560
	3	1,112	1,601	1,542
	4	1,349	2,109	1,866
	5	1,691	2,524	2,627
Urban	6	1,543	2,533	2,618

APPENDIX B Standardization

Insurance loss experience varies in relation to certain nonvehicle factors. With respect to Personal Injury Protection (PIP) coverages, one important factor that influences loss experience is operator age. Youthful operators generally have worse loss experience than older drivers. Thus, the proportion of youthful operators must be taken into consideration in comparing the loss experience of different vehicles.

To reduce any biases that could result because of variations among different vehicles in an operator age group, PIP coverage results for vehicles in this study were weighted, or standardized, to produce a weighted average of actual results. The weights used in the standardization procedure are shown below.

Operator Age Group	Distribution
Youthful	0.10
No Youthful	0.90

With respect to collision coverages, both the frequency and average size of collision losses vary with the deductible amount and the age group of the operators. Therefore, collision coverage results for the vehicles in this study were standardized using the weights shown below.

Deductible	Youthful Operator	No Youthful Operator
< $150	0.05	0.50
≥ $150	0.05	0.40

Similary, theft claim frequency and average size of theft losses were also standardized using the weights shown below.

Deductible	Youthful Operator	No Youthful Operator
= $0	0.05	0.50
> $0	0.05	0.40

Standardizing for the nonvehicle factors of age and deductible ensures that their mix is the same for each result. Therefore, to the extent that age distributions within each operator age group and amounts within each deductible group do not vary substantially for different vehicles, these effects will not bias comparisons among the various results.

The standardization procedure employed is widely used in health statistics.* The basic principle of the method is the introduction of a selected population with a standard distribution across operator age group or across the combination of operator age group and deductible, as represented by the standardization weights in the tables.

*For example, see Armitage, P. *Statistical Methods in Medical Research*, Wiley, New York (1971).

APPENDIX C Definitions

Average Loss Payment per Claim - The total of all loss payments made for the claims for a group of vehicles, divided by the number of claims paid and expressed as dollars per claim.

Average Loss Payment per Insured Vehicle Year - For a group of vehicles, the product of Claim Frequency and Average Loss Payment per Claim expressed as dollars per insured vehicle year. It should be noted that this definition differs from the commonly used insurance term, pure premium, but yields similar results.

Claim Frequency - The number of claims for a group of vehicles, divided by the exposure for that group.

Deductible Amount - That portion of the collision damage cost borne by the policyholder. For computing results, collision deductible amounts are split into two groups; less than $150 (mainly $50 and $100 deductibles) and greater than or equal to $150 (mainly $200 and $250 deductibles).

Exposure - The time interval an individual vehicle is insured. Exposure for a group of vehicles is expressed in units of insured vehicle years.

No Youthful Operator - For purposes of this report, all males and females (married or single) at least 25 years of age and all married females under 25 years of age.

Operator Age Group - The factor that distinguishes those vehicles whosed rated driver is youthful from those vehicles whose rated driver is not youthful (see Youthful and No Youthful Operator).

Passenger Vehicles - There are four major body style groupings of passenger vehicles—regular two-door models, regular four-door models, station wagons and passenger vans, and sports and specialty models. Sports and specialty models include all two-seater cars, all convertibles, all midsize and large cars with two or fewer designated rear seating positions, and all luxury cars. Each body style group is further divided into size class subgroups based on wheelbase (rounded to nearest inch) defined as follows:

Small - Vehicles with wheelbases less than or equal to 99 inches.

Midsize - Vehicles with wheelbases greater than 99 inches and less than or equal to 109 inches.

Large - Vehicles with wheelbases greater than 109 inches.

Personal Injury Protection Coverage - First party no-fault coverage in which an insurer pays, within the specified limits, the medical, hospital, and other expenses of the insured, others in his vehicle, and pedestrians struck by him.

Rated Driver - The driver considered to represent the greatest risk for the policy of an insured vehicle.

Youthful Operator - For the purposes of this report, all males (married or single) under 25 years of age and all unmarried females under 25 years of age.

HLDI Publications

Research reports published by the Highway Loss Data Institute are:

R72-1 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1972 Models,* June 1973.

R73-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1973 Models Compared with 1972 Models,* September 1973.

R73-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models,* March 1974.

R73-3 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models During Their First Two Years,* December 1974.

R73-4 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models During Their First Three Years,* December 1975.

R74-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1974 Models,* May 1974.

R74-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1974 Models During Their First Year,* December 1974.

R74-3 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1974 Models During Their First Two Years,* December 1975.

R75-1 *Automobile Insurance Losses, Collision Coverages, Initial Results for 1975 Models,* July 1975.

R75-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1975 Models During Their First Year,* December 1975.

R76-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1976 Models,* June 1976.

R76-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1976 Models During Their First Year, 1975 Models During Their First Two Years, 1974 Models During Their First Three Years,* December 1976.

R77-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1977 Models,* June 1977.

R77-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1977 Models During Their First Year, 1976 Models During Their First Two Years, 1975 Models During Their First Three Years,* December 1977.

R78-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1978 Models,* June 1978.

R78-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1978 Models During Their First Year, 1977 Models During Their First Two Years, 1976 Models During Their First Three Years,* January 1979.

R79-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1979 Models,* June 1979.

R79-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1979 Models During Their First Year, 1978 Models During Their First Two Years, 1977 Models During Their First Three Years,* December 1979.

R80-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1980 Models,* June 1980.

R80-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1980 Models During Their First Year, 1979 Models During Their First Two Years, 1978 Models During Their First Three Years,* December 1980.

R81-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1981 Models,* July 1981.

R81-2 *Insurance Losses, Collision Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1981 Models During Their First Year, 1980 Models During Their First Two Years, 1979 Models During Their First Three Years,* December 1981.

R82-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1982 Models,* July 1982.

R82-2 *Insurance Losses, Collision Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1982 Models During Their First Year, 1981 Models During Their First Two Years; 1980 Models During Their First Three Years,* December 1982.

R83-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1983 Models,* June 1983.

R83-2 *Insurance Losses, Collision Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1983 Models During Their First Year, 1982 Models During Their First Two Years, 1981 Models During Their First Three Years,* January 1984.

R84-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1984 Models,* June 1984.

R84-2 *Insurance Losses, Collision Coverages; Passenger Vehicles, Vans, Pickups, and Utility Vehicles; 1984 Models During Their First Year, 1983 Models During Their First Two Years, 1982 Models During Their First Three Years,* January 1985.

R85-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1985 Models,* July 1985.

R85-2 *Insurance Collision Report, Passenger Vehicles, Vans, Pickups, and Utility Vehicles, 1985 Models During Their First Year, 1984 Models During Their First Two Years, 1983 Models During their First Three Years,* January 1986.

R86-1 *Insurance Collision Report, Initial Results for 1986 Automobiles,* August 1986.

R86-2 *Insurance Collision Report, Passenger Cars, Vans, Pickups, and Utility Vehicles, 1986 Models During Their First Year, 1985 Models During Their First Two Years, 1984 Models During Their First Three Years* December 1986.

R87-1 *Insurance Collision Report, Initial Results for 1987 Automobiles,* July 1987.

R87-2 *Insurance Collision Report, Passenger Cars, Vans, Pickups, and Utility Vehicles, 1987 Models During Their First Year, 1986 Models During Their First Two Years, 1985 Models During Their First Three Years,* December 1987.

V78-1 *Automobile Insurance Losses, Non-Commercial Collision Coverages; Variations by Make and Series, Vans, Pickups and Utility Vehicles; 1978 Models During Their First Year, 1977 Models During Their First Two Years,* February 1979.

V79-1 *Automobile Insurance Losses, Non-Commercial Collisions Coverages; Variations by Make and Series, Vans, Pickups and Utility Vehicles; 1979 Models During Their First Year, 1978 Models During Their First Two Years,* April 1980.

V79-2 *Automobile Insurance Losses, Personal Injury Protection Coverages; Claim Frequency Results by Size of Claim for 1977, 1978, and 1979 Vans, Pickup Trucks, and Utility Vehicles,* October 1980.

V79-3 *Insurance Theft Losses; Vans, Pickups, and Utility Vehicles, 1979 Models,* May 1981.

V80-1 *Automobile Insurance Losses, Non-Commercial Collision Coverages; Variations by Make and Series, Vans, Pickups, and Utility Vehicles; 1980 Models During Their First Year, 1979 Models During Their First Two Years, 1978 Models During Their First Three Years,* December 1980.

V80-2 *Automobile Insurance Losses, Personal Injury Protection Coverages; Injury Claim Frequency Results by Size of Claim; Vans, Pickup Trucks, and Utility Vehicles, 1977-1980 Models,* September 1981.

I75-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974 and 1975 Models,* June 1976.

I75-2 *Automobile Insurance Losses, Percentage of Collision Claims with Associated Injury Claims for 1974 and 1975 Models,* March 1977.

I76-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974, 1975, and 1976 Models,* November 1977.

I76-2 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974, 1975, and 1976 Models,* September 1978.

I77-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1977 Models,* September 1978.

I78-1 *Automobile Insurance Losses, Personal Injury Protection Coverages; Claim Frequency Results for 1977 and 1978 Models,* September 1979.

I79-1 *Automobile Insurance Losses, Personal Injury Protection Coverages; Claim Frequency Results by Size of Claim for 1977, 1978, and 1979 Models,* October 1980.

I80-1 *Automobile Insurance Losses, Personal Injury Protection Coverages; Claim Frequency Results by Size of Claim; 1978-1980 Models,* September 1981.

I81-1 *Insurance Losses, Personal Injury Protection Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1979-1981 Models,* September 1982.

I82-1 *Insurance Losses, Personal Injury Protection Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1980-1982 Models,* September 1983.

I83-1 *Insurance Losses, Personal Injury Protection Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1981-1983 Models,* September 1984.

I84-1 *Insurance Losses, Personal Injury Protection Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1982-1984 Models,* August 1985.

I85-1 *Insurance Injury Report, Passenger Cars, Vans, Pickups, and Utility Vehicles; 1983-1985 Models,* August 1986.

I86-1 *Insurance Injury Report, Passenger Cars, Vans, Pickups, and Utility Vehicles; 1984-1986 Models,* August 1987.

A-1 *Automobile Insurance Losses, Collision Coverages; A Comparison of Results for 1972 and 1973 Models,* May 1974.

A-2 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Density, 1972 and 1973 Models,* September 1974.

A-3 *Automobile Insurance Losses, Collision Coverages; A Comparison of Results for 1973, 1974 and 1975 Models,* July 1975.

A-4 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Density, 1974 and 1975 Models,* December 1975.

A-5 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Body Style, 1974 and 1975 Models,* December 1975.

A-6 *Automobile Insurance Losses, Collision Coverages; An Investigation of Relationships Between Losses and Engine Specifications, Using 1973 Models,* June 1976.

A-7 *Automobile Insurance Losses, Collision Coverages; Annual Increases and Seasonal Variations 1972, 1973, 1974 and 1975 Models,* June 1976.

A-8 *Automobile Insurance Losses, Injury Coverages; A Preliminary Comparison of Results for Volkswagen Rabbits with Passive and Active Seat Belts, 1975 and 1976 Models,* June 1977.

A-9 *Automobile Insurance Losses, Collision Coverages; A Comparison of Collision Claim Size Distributions for 1974, 1975, and 1976 Models,* November 1977.

A-10 *Automobile Insurance Losses, Injury Coverages; Comparisons of Claim Frequencies of Volkswagen Rabbits with Automatic and Manual Seat Belts, 1975, 1976, and 1977 Models,* June 1979.

A-11 *Automobile Insurance Losses, Collision Coverages; The Consistency of the Loss Experience of Specific Vehicles Produced in Several Years, 1975 to 1978 Models,* June 1979.

A-12 *Automobile Insurance Losses, Collision Coverages; An Assessment of the Effects of the Federal Safety Bumper Standard on the Losses for 1972 Through 1978 Models,* June 1980.

A-13 *Automobile Insurance Losses, Personal Injury Protection and Collision Coverages; The Effects of Car Size on Crash Losses, 1977-1980 Models,* May 1981.

A-14 *Automobile Insurance Losses, Personal Injury Protection and Collision Coverages; Comparisons of the Loss Experience of Two- and Four-Door Cars, 1978, 1979, and 1980 Models,* June 1981.

A-15 *Automobile Insurance Losses, Personal Injury Protection and Collision Coverages; Relationships Between Injury and Collision Losses and Engine Options for Selected 1977-1979 Compact Cars,* June 1981.

A-16 *Automobile Insurance Losses, Collision Coverages; The Frequency of Claims Involving Salvage; Subcompact and Compact Cars; 1980 Models,* January 1982.

A-17 *Insurance Losses, Comprehensive Coverages; Non-Crash Fire Losses; 1979-1980 Models,* February 1982.

A-18 *Insurance Losses, Theft Coverages; The Distribution of Theft Loss Payment Amounts; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1981 Models During Their First Year, 1980 Models During Their First Two Years; 1979 Models During Their First Three Years,* June 1982.

A-19 *Insurance Losses, Theft Coverages; A Comparison of the Theft Loss Experience of General Motors Passenger Cars With and Without Factory-Installed Theft Deterrent Systems; 1980-1981 Models,* January 1983.

A-20 *Insurance Losses, Collision Coverages, A Comparison of the Collision Loss Experience of Subaru Models with 5 and 2.5 MPH Bumpers,* April 1983.

A-21 *Insurance Losses, Personal Injury Protection Coverages, Injury Claim Frequencies for Volkswagen Rabbits with Automatic and Manual Seat Belts, 1981 and 1982 Models,* April 1984.

A-22 *Insurance Losses, Collision Coverages, An Analysis of Salvage Credits, 1977 Through 1982 Model Year Cars,* July 1984.

A-23 *Injury and Collision Losses by Engine Option, Selected 1983 Models,* October 1985.

A-24 *Comparison of the Insurance Loss Experience of Unibody and Frame Construction Cars After a Collision Repair, 1981-82 Models,* October 1985.

A-25 *Relationships Between Losses and Vehicle Density, 1982-84 Models,* October 1985.

A-26 *Consistency of Model Year Injury Claim Frequency Results for Selected 1981-1983 Models,* May 1986.

A-27 *A Preliminary Evaluation of New York and New Jersey Insurance Injury Claim Results Before and After Enactment of Mandatory Seat Belt Legislation; 1983-85 Models,* May 1986.

A-28 *Insurance Injury Loss Experience in Eight States with Seat Belt Laws, 1983-86 Models,* 1988 in press.

A-29 *Insurance Losses Based on Garaging Location, 1985-87 Models,* June 1988.

A-30 *Automobile Insurance Losses, A Comparison of California and National Results,* May 1988.

T79-1 *Automobile Insurance Theft Losses by Make and Series; 1979 Models,* June 1980.

T80-1 *Automobile Insurance Theft Losses by Make and Series; 1979 and 1980 Models,* April 1981.

T81-1 *Insurance Losses, Theft Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1981 Models During Their First Year, 1980 Models During Their First Two Years, 1979 Models During Their First Three Years,* May 1982.

T82-1 *Insurance Losses, Theft Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1982 Models During Their First Year, 1981 Models During Their First Two Years, 1980 Models During Their First Three Years,* May 1983.

T83-1 *Insurance Losses, Theft Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1983 Models During Their First Year, 1982 Models During Their First Two Years, 1981 Models During Their First Three Years,* May 1984.

T84-1 *Insurance Losses, Theft Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1984 Models During Their First Year, 1983 Models During Their First Two Years, 1982 Models During Their First Three Years,* March 1985.

T85-1 *Insurance Theft Report; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1985 Models During Their First Year, 1984 Models During Their First Two Years, 1983 Models During Their First Three Years,* April 1986.

T86-1 *Insurance Theft Report; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1986 Models During Their First Year, 1985 Models During Their First Two Years, 1984 Models During Their First Three Years,* May 1987.

T87-1 *Insurance Theft Report; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1987 Models During Their First Year, 1986 Models During Their First Two Years, 1985 Models During Their First Three Years,* June 1988.

A5200-4.21 F 8/88

INSURANCE SPECIAL REPORT

Insurance Injury Loss Experience in Eight States with Seat Belt Laws, 1983-86 Models

Highway Loss Data Institute

A-28

Highway Loss Data Institute
Insurance Special Report

Insurance Injury Loss Experience in Eight States with Seat Belt Laws, 1983-86 Models. HLDI A-28

Permission to quote from or to reproduce material from this publication is granted when due acknowledgment is made.
Highway Loss Data Institute — Watergate Six Hundred — Washington, D.C. 20037
Research Report HLDI A-28; July 1988
© 1988 HLDI

The membership of the Highway Loss Data Institute Board of Directors and the Technical Resource Committee represents insurance companies that are supplying data to HLDI. Financial support for HLDI is provided through the Insurance Institute for Highway Safety, which in turn is supported by most automobile insurers either directly or through their trade associations.

Board of Directors

J. B. Conners, Chairman
Liberty Mutual Insurance Company

M. Albaum
Prudential Property and Casualty Insurance Company

C. A. Bryan
United Services Automobile Association

E. Gottheim
Government Employees Insurance Company

G. Jerabek
Nationwide Mutual Insurance Company

G. C. Klingman
The Travelers Insurance Companies

R. S. Lawson
Alliance of American Insurers

A. Longley-Cook
Aetna Life and Casualty

D. Snyder
American Insurance Association

W. W. Sorenson
State Farm Mutual Automobile Insurance Company

J. S. Trees
Allstate Insurance Company

T. E. Troxel
National Association of Independent Insurers

B. O'Neill, ex officio
Highway Loss Data Institute

Technical Resource Committee

M. Albaum, Chairman
Prudential Property and Casualty Insurance Company

C. A. Bryan
United Services Automobile Association

R. O. Elder
Highway Loss Data Institute

E. Gottheim
Government Employees Insurance Company

G. Jerabek
Nationwide Mutual Insurance Company

G. C. Klingman
The Travelers Insurance Companies

A. Longley-Cook
Aetna Life and Casualty

R. Muleski
Liberty Mutual Insurance Company

B. O'Neill
Highway Loss Data Institute

W. W. Sorenson
State Farm Mutual Automobile Insurance Company

J. S. Trees
Allstate Insurance Company

CONTENTS

1 **Summary**
2 **Introduction**
2 **Results**
3 New York
8 New Jersey
13 Michigan
17 Texas
22 Connecticut
26 Florida
30 Kansas
34 Maryland
38 **Discussion**
39 **Appendix A** Standardization
39 **Appendix B** Definitions
40 **Appendix C** Adjustment Procedure for Claim Reporting Delays
41 **HLDI Publications**

2 **Table 1** State Seat Belt Laws Enforcement Dates and Penalty
4 **Table 2** Collision and Injury Claim Frequencies for New York State
4 **Table 3** Youthful and No-Youthful Operator Age Group Claim Frequencies for New York State
5 **Table 4** Percentage Shoulder Belt Use by Car Drivers and Right Front-Seat Passengers in New York State
6 **Table 5** Injury Claim Frequencies by Quarter for New York State
7 **Table 6** Percentage of Collision Claims with Associated Injury Claims for New York State
9 **Table 7** Collision and Injury Claim Frequencies for New Jersey
9 **Table 8** Youthful and No-Youthful Operator Age Group Claim Frequencies for New Jersey
10 **Table 9** Percentage Shoulder Belt Use by Car Drivers and Right Front-Seat Passengers in New Jersey
11 **Table 10** Injury Claim Frequencies by Quarter for New Jersey
12 **Table 11** Percentage of Collision Claims with Associated Injury Claims for New Jersey
13 **Table 12** Collision and Injury Claim Frequencies for Michigan
14 **Table 13** Youthful and No-Youthful Operator Age Group Claim Frequencies for Michigan
14 **Table 14** Percentage Shoulder Belt Use by Front Seat Occupants in Michigan
15 **Table 15** Injury Claim Frequencies by Quarter for Michigan
16 **Table 16** Percentage of Collision Claims with Associated Injury claims for Michigan
17 **Table 17** Collision and Injury Claim Frequencies for Texas
18 **Table 18** Youthful and No-Youthful Operator Age Group Claim Frequencies for Texas
19 **Table 19** Percentage Shoulder Belt Use by Car Drivers and Right Front-Seat Passengers in Texas
20 **Table 20** Injury Claim Frequencies by Quarter for Texas
21 **Table 21** Percentage of Collision Claims with Associated Injury Claims for Texas
22 **Table 22** Collision and Injury Claim Frequencies for Connecticut
23 **Table 23** Youthful and No-Youthful Operator Age Group Claim Frequencies for Connecticut
24 **Table 24** Injury Claim Frequencies by Quarter for Connecticut
25 **Table 25** Percentages of Collision with Associated Injury Claims for Connecticut
26 **Table 26** Collision and Injury Claim Frequencies for Florida
27 **Table 27** Youthful and No-Youthful Operator Age Group Claim Frequencies for Florida
28 **Table 28** Injury Claim Frequencies by Quarter for Florida
29 **Table 29** Percentage of Collision Claims with Associated Injury Claims for Florida
30 **Table 30** Collision and Injury Claim Frequencies for Kansas
31 **Table 31** Youthful and No-Youthful Operator Age Group Claim Frequencies for Kansas
32 **Table 32** Injury Claim Frequencies by Quarter for Kansas
33 **Table 33** Percentage of Collision Claims with Associated Injury Claims for Kansas
34 **Table 34** Collision and Injury Claim Frequencies for Maryland
35 **Table 35** Youthful and No-Youthful Operator Age Group Claim Frequencies for Maryland
36 **Table 36** Injury Claim Frequencies by Quarter for Maryland
37 **Table 37** Percentage of Collision Claims with Associated Injury Claims for Maryland

SUMMARY

A previous Highway Loss Data Institute report (HLDI Report A-27) provided preliminary insurance claim loss experience results for New York and New Jersey, the first two states to pass laws requiring seat belt usage. That preliminary report found that, after implementation of seat belt use laws, both states had overall injury claim frequency results for relatively new cars that were somewhat lower than those before the laws were enacted. The comparisons in that earlier report, however, were based on the immediate post-law periods when belt wearing rates tend to be highest. This report provides additional information on those states and examines insurance losses in additional belt law states — Connecticut, Florida, Kansas, Maryland, Michigan, and Texas. The frequency of injury claims by occupants of relatively new cars (1983-86 model years) before and after each of the the eight states enacted mandatory seat belt laws are presented. A number of pre-law and post-law comparison analyses were performed for this report. For each of the eight states, injury claim frequencies were computed for the 12-month period before the belt law went into effect and one or two 12-month periods after the law.

Although there is evidence from several studies that state seat belt laws have reduced the frequency of serious and fatal injuries by about 5-10 percent, the present study found no clear cut evidence of comparable reductions in personal injury protection coverage claims in the recent model cars studied. There are several possible explanations for this apparently ambiguous result: Belts are much less effective in preventing relatively minor injuries than serious and fatal injuries and most insurance injury claims are for relatively minor, but often expensive, injuries. Only relatively simple before and after comparisons were used and normal year-to-year fluctuations could easily mask the relatively small (5-10 percent) reductions expected from the observed increases in belt use following the belt laws. Belt use in relatively new cars is known to be higher than in older cars so that the actual increases in usage due to the laws in new cars may be much smaller than in the overall population of vehicles.

Principal Findings:

- Post-law injury claim frequencies were generally lower than pre-law results in Michigan, Connecticut, and New Jersey. Post-law injury claim frequencies were either comparable to, or greater than, pre-law injury claim frequencies in New York, Texas, Florida, Kansas, and Maryland.
- In Michigan, claim frequencies were lower for the two 12-month post-law periods regardless of the size of the injury claim. Post-law frequencies in Connecticut were lower for all injury claims and for those exceeding $250 and $500. New Jersey frequencies were slightly lower during the first 12-month post-law period for all injury claims and those above $250.
- Based on reported observations of changes in belt use, the post-law injury claim frequency reductions in Michigan were larger than expected from the seat belt use law alone, which strongly suggests that other factors are influencing the results.
- The percentage of collision coverage claims also having an injury claim was generally lower in the post-law period in New York, New Jersey, Michigan, and Connecticut. In Texas, this percentage increased during the post-law period.

INTRODUCTION

The Highway Loss Data Institute (HLDI) is a nonprofit, public service organization that gathers, processes, and publishes insurance data concerning the human and economic losses associated with motor vehicles.

This report updates and expands a previous HLDI analysis (HLDI Report A-27) comparing the insurance claim loss experience in states with mandatory seat belt use laws. The earlier report provided preliminary results for New York and New Jersey, the first two states requiring seat belt usage. This report provides additional information on those states and also presents insurance losses for Michigan, Texas, Connecticut, Florida, Kansas, and Maryland.

For the eight states included in this report, Table 1 presents the penalty prescribed by each state's law and the enforcement date(s) that penalties went into effect. New York's, Texas', and Connecticut's statutes permit police to stop motorists solely on the basis of belt use law violations. Under the other five states' laws, police are permitted to cite violators only if they have been stopped for some other traffic violation. Seven of the states in this study have no-fault automobile insurance laws requiring personal injury protection coverage; in Texas, personal injury protection coverage is voluntary.

TABLE 1 State Seat Belt Laws Enforcement Dates and Penalty

State	Enforcement Dates	Fines
New York	January 1, 1985	$50 maximum
New Jersey	March 1, 1985	$20
Michigan	July 1, 1985	$10
	January 1, 1986	$25
Texas	December 1, 1985	$25-$50
Connecticut	February 1, 1986	$15
Florida	January 1, 1987	$20
Kansas	July 1, 1987	$10 maximum
Maryland	July 1, 1986	$25 maximum

In this report, the frequency of injury claims* to occupants of relatively new cars (1983-86 model years) is compared before and after each of the eight states enacted its mandatory seat belt law. This report is based on personal injury protection and collision coverage loss data supplied by 13 insurers: Aetna, Allstate, Fireman's Fund, GEICO, Kemper, Liberty Mutual, Nationwide, Prudential, Safeco, Sentry, State Farm, Travelers, and USAA.

RESULTS

For this study, only loss results of 1983-86 model year passenger vehicles with both personal injury protection and collision coverage simultaneously in effect were used. The following statistical summaries are presented for each of the eight states:

- Collision and injury claim frequencies** for the 12-month period immediately preceding introduction of a mandatory usage law are compared to claim frequencies for successive 12-month periods after implementation of the law;
- Collision and injury claim frequencies for youthful and no-youthful operator age groups*** are compared for the 12-month pre-law and post-law periods;
- Quarterly injury claim frequencies are compared corresponding to the specified pre-law and post-law 12-month periods; and
- The percentage of collision coverage claims having associated personal injury protection claims is calculated for specified pre-law and post-law calendar periods.

In addition, belt usage rates obtained from observational studies performed by the Insurance Institute for Highway Safety (IIHS) in New York, New Jersey, and Texas and by the University of Michigan Transportation Research Institute in Michigan are presented.

Because payments on an injury claim can extend over a number of months, the claim amount of a specific injury claim can vary over time. Therefore, claim frequencies for specified periods — pre-law, post-law, or a specified calendar quarter — are affected by the "age" of the claims within the periods. Some claims may not be counted in the various injury claim frequency categories because of when the claim was filed and how the payments were scheduled. Because of this accounting delay, the injury claim frequencies were adjusted using estimated proportions of claims expected in each of the individual months (i.e., claims of similar monthly age) of the pre-law, post-law, or quarterly periods. The monthly proportions were estimated using an "aged" subset of claims for the oldest model year — 1983. The expected monthly proportions were combined using each state's monthly claim distribution to determine adjustment factors for pre-law, post-law, or quarterly calendar periods of each state. For a more detailed discussion of the empirical adjustment procedure, see Appendix C.

* In calculating injury claim frequencies, all injuries in a crash-involved car resulting in claims for medical expenses made under personal injury coverages are counted as a single claim. A description of these first party coverages, which principally insure against medical losses to occupants of the insured cars themselves, is given in Appendix B.

** Collision results were standardized to minimize effects due to differences in operator age and deductible amounts. The injury results were standardized to insure the same mix of exposure for youthful and no-youthful operators. For a more detailed discussion of standardization see Appendix A.

*** See Appendix B for definitions of youthful and no-youthful operator age groups.

New York

Table 2 presents New York's overall collision and injury claim frequencies for the pre-law year 1984 and post-law years 1985 and 1986. Injury claim frequency results are presented for four injury claim categories: all injury claims, and injury claims exceeding $250, $500, and $1,000. The pre-law results include 1983, 1984, and 1985 models; the post-law results include 1983, 1984, 1985, and 1986 models. The pre-law claim frequencies are based on approximately 420,000 insured vehicle years, and the two post-law claim frequencies are based on nearly 770,000 insured vehicle years for 1985 and 1.1 million insured vehicle years for 1986. Collision claim frequencies are also presented in order to assess whether reductions in injury claim frequencies might be attributed to reduced levels of collision involvement during the post-law periods. Post-law percent changes are expressed relative to the pre-law 1984 calendar results. Collision claim frequencies for the three years are fairly stable. For the four injury claim categories, the 1985 post-law injury claim frequencies are comparable to corresponding 1984 pre-law results. The 1986 post-law injury claim frequency for all injury claims is comparable to the 1984 pre-law value. However, for injury claims over $250, $500, and $1,000, the 1986 post-law claim frequencies increased by four to seven percent over the pre-law frequencies.

Because the youthful and no-youthful operator age groups might comply differently with the mandatory usage laws, claim frequency results were also examined for the two age groups (Table 3). For both age groups, New York's 1985 post-law collision claim frequencies increased two to three percent relative to the pre-law collision claim frequencies. The injury claim frequencies for this post-law period decreased by four percent for youthful operators and increased by two percent for the no-youthful operator age group. For 1986, the post-law collision values decreased two percent for youthful operators and remained the same for the no-youthful operator age group. For injury claims, the post-law 1986 claim frequencies for youthful operators decreased by about five percent and increased by about three percent for the no-youthful operator age group.

Studies of seat belt usage rates in states with mandatory use laws have shown that compliance with the laws generally decreases over time. The Insurance Institute for Highway Safety (IIHS) has conducted ongoing observational surveys of shoulder belt use compliance in a number of large urban areas, small cities, and intercity areas of New York, New Jersey, and Texas.[1] The University of Michigan Transportation Research Institute (UMTRI) has been conducting observational surveys of seat belt use among motor vehicle occupants throughout Michigan. Although the survey methodologies are not exactly the same, UMTRI's results provide a consistent base for monitoring restraint use over time in Michigan.[2]

For each state, belt use was observed several months before the law went into effect and during the first month of enforcement. For the four states, large initial increases in belt use were observed over the pre-law levels. In New York (see Table 4) compliance was generally stable for the first and fourth months of the law (January and April of 1985). However, follow-up surveys conducted in August 1985, January 1986, June 1986, and January 1987 showed, for the most part, lower levels of compliance in comparison to the January and April 1985 survey results.

Because of these differing patterns of belt usage rates, the injury claim frequency results were also examined by calendar quarter (Table 5). For all injury claims, the first quarter's claim frequency of the 1985 post-law period was 11 percent lower than the corresponding quarter one year earlier. The second quarter's 1985 post-law result also showed a decrease; however, it was smaller (three percent). The third and fourth quarter 1985 post-law values remained the same and increased by 11 percent, respectively. Relative to the pre-law values, only the first quarter 1986 result decreased for the 1986 post-law period. For injury claims exceeding $250 and $500, the first and second quarters of the 1985 period also showed decreased claim frequencies but the third and fourth quarter post-law results had offsetting increases. For these injury claims, post-law 1986 quarterly results remained the same or increased relative to the pre-law 1984 results. For the more severe injury claims above $1,000, the pre-law and 1985 post-law quarterly results were generally similar, but the post-law 1986 quarterly results increased.

In addition to the preceding analyses, pre-law and post-law comparisons of the percentage of collision coverage claims having associated personal injury protection claims were also performed (Table 6). The percentages were calculated for four separate sets of collision damage amount claims: all collisions, collisions with damage exceeding $1,000, $3,000, and $5,000. Collision damage amounts were determined by adding collision deductible to the paid claim amount. For each set of collision claims, pre-law and post-law percentages were calculated for all injury claims and injury claims exceeding $250, $500, and $1,000. For example, out of a total 49,438 collision claims occurring during the pre-law period, 12.52 percent had an associated injury claim and 6.7 percent had an injury claim greater than $250.

The percentages of collision claims with associated injury claims all declined in the 1985 post-law period. For all collision claims, decreases ranged from 2.5 to 4.1 percent regardless of injury claim size. For collision claims overall, the post-law percentages with injury claims for 1986 increased by 2.6 to 8.1 percent over the injury claim size categories. For collision damage exceeding $1,000, $3,000, and $5,000, the percentages with injury claims were smaller for the 1985 and 1986 post-law periods. In many cases, the reductions were greater for the 1985 post-law period.

TABLE 2 Collision and Injury Claim Frequencies for New York State

	Pre-Law	Post-Law			
	Jan.-Dec. 1984	Jan. Dec. 1985		Jan.-Dec. 1986	
		Frequency	% Change	Frequency	% Change
Collision	12.1	12.3	+2	12.0	-1
Injury					
All	20.5	20.6	0	20.8	+1
>$250	10.6	10.6	0	11.1	+5
>$500	7.4	7.4	0	7.9	+7
>$1,000	5.2	5.2	0	5.4	+4

TABLE 3 Youthful and No-Youthful Operator Age Group Claim Frequencies for New York State

	Pre-Law	Post-Law			
	Jan.-Dec. 1984	Jan.-Dec. 1985		Jan.-Dec. 1986	
		Frequency	% Change	Frequency	% Change
Collision					
Youthful Operator Age Group*	17.1	17.6	+3	16.8	-2
No-Youthful Operator Age Group*	11.5	11.7	+2	11.5	0
Injury					
Youthful Operator Age Group	32.4	31.0	-4	30.8	-5
No-Youthful Operator Age Group	19.1	19.4	+2	19.6	+3

* Standardized for collision deductible group.

TABLE 4 Percentage Shoulder Belt Use by Car Drivers and Right Front-Seat Passengers* in New York State

	Pre-Law	Post-Law					
	September 1984	January 1985	April 1985	August 1985	January 1986	June 1986	January 1987
Large Urban Areas							
Albany	12	50	52	--	42	57	54
Buffalo	12	68	66	47	41	57	43
Nassau/Queens	11	49	49	39	38	38	41
Westchester/Bronx	15	57	61	--	46	32	37
Syracuse	18	81	70	49	54	48	46
Small Cities							
Elmira	14	62	52	--	65	62	63
Glens Falls	11	55	47	45	42	44	44
Jamestown	8	48	48	--	37	38	39
Rome	14	60	51	44	38	35	37
Watertown	14	43	43	40	39	38	39
Intercity	30	76	66	--	61	61	58

* Passengers estimated to be under seven years excluded.

TABLE 5 Injury Claim Frequencies by Quarter for New York State

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
All Injury Claims				
Pre-Law (1984)	20.4	20.8	19.8	20.8
Post-Law (1985)	18.2	20.1	19.8	23.1
Change	-11%	-3%	0%	+11%
Post-Law (1986)	19.2	21.2	21.1	21.3
Change	-6%	+2%	+7%	+2%
Injury Claims >$250				
Pre-Law (1984)	10.0	11.0	10.2	10.9
Post-Law (1985)	9.2	10.3	10.9	11.5
Change	-8%	-6%	+7%	+6%
Post-Law (1986)	10.0	11.3	11.5	11.6
Change	0%	+3%	+13%	+6%
Injury Claims >$500				
Pre-Law (1984)	6.7	7.5	7.3	7.7
Post-Law (1985)	6.4	7.3	7.5	8.1
Change	-4%	-3%	+3%	+5%
Post-Law (1986)	7.1	8.1	8.1	8.1
Change	+6%	+8%	+11%	+5%
Injury Claims >$1,000				
Pre-Law (1984)	4.7	5.1	5.3	5.6
Post-Law (1985)	4.6	5.1	5.2	5.7
Change	-2%	0%	-2%	+2%
Post-Law (1986)	4.9	5.4	5.6	5.7
Change	+4%	+6%	+6%	+2%

TABLE 6 Percentage of Collision Claims with Associated Injury Claims for New York State

	No. Collision Claims	Injury Claim Size			
		All	>$250	>$500	>$1,000
All Collisions					
Pre-Law	49,438	12.52	6.70	4.71	3.39
First Post-Law	86,715	12.05	6.51	4.59	3.25
Change		-3.8%	-2.8%	-2.5%	-4.1%
Second Post-Law	101,105	12.84	7.17	5.09	3.50
Change		+2.6%	+7.0%	+8.1%	+3.2%
Collisions >$1,000					
Pre-Law	28,169	20.02	10.91	7.64	5.51
First Post-Law	51,495	18.34	9.99	7.03	4.99
Change		-8.4%	-8.4%	-8.0%	-9.4%
Second Post-Law	63,635	18.62	10.48	7.45	5.13
Change		-7.0%	-3.9%	-2.5%	-6.9%
Collisions >$3,000					
Pre-Law	9,917	37.91	22.55	16.41	12.12
First Post-Law	18,223	35.28	20.56	14.74	10.66
Change		-6.9%	-8.8%	-10.2%	-12.0%
Second Post-Law	24,269	34.59	20.88	14.96	10.47
Change		-8.8%	-7.4%	-8.8%	-13.6%
Collisions >$5,000					
Pre-Law	4,902	47.49	31.01	23.62	18.16
First Post-Law	8,669	44.62	28.06	20.79	15.32
Change		-6.0%	-9.5%	-12.0%	-15.6%
Second Post-Law	11,689	44.60	29.28	21.83	15.76
Change		-6.1%	-5.6%	-7.6%	-13.2%

Note: Pre-law period was Jan.-Dec. 1984, the first post-law period was Jan.-Dec. 1985, and the second post-law period was Jan-Dec. 1986.

New Jersey

New Jersey's mandatory belt usage law went into effect on March 1, 1985. The pre-law period for this state extends from March 1, 1984 through February 28, 1985. The two 12-month post-law comparison periods for this state are March 1, 1985 through February 28, 1986, and March 1, 1986 through February 28, 1987.

New Jersey's overall collision and injury claim frequencies are presented in Table 7. The pre-law results are based on approximately 170,000 insured vehicle years; the results for the two post-law periods are based on approximately 300,000 and 435,000 insured vehicle years. New Jersey's 1985 and 1986 post-law collision claim frequencies increased by 4 and 11 percent, respectively, over the 1984 pre-law collision claim frequency. Injury claim frequencies for the first 12 months after the law went into effect were very close to those of the preceding 12-month pre-law period. The injury claim frequencies for the second 12-month post-law period increased by three percent for all claims and claims over $250, five percent for claims over $500, and ten percent for those above $1,000 relative to the corresponding pre-law frequencies.

New Jersey's first post-law period collision frequencies increased by eight percent and five percent for the youthful and no-youthful operator age groups, respectively (Table 8). In contrast, the injury claim frequency for the youthful age group decreased by three percent relative to the pre-law level and was comparable for the no-youthful age group in the pre-law and initial post-law periods. For the next 12-month post-law period, the collision claim frequencies increased 16 and 10 percent for the youthful and no-youthful operator age groups, respectively. During this period, injury claim frequency for youthful operators increased by 10 percent relative to the pre-law period's results and increased by 2 percent for the no-youthful operator age group.

For New Jersey, substantial initial increases in belt use were also observed over pre-law levels (see Table 9). Several of the areas surveyed by IIHS in New Jersey during July 1985 and April 1986 showed lower usage rates in comparison to the March 1985 results. Generally, the New Jersey results suggest decreasing compliance over time.

For all injury claims, the post-law 1985 and 1986 first and second quarter claim frequencies decreased relative to their corresponding pre-law quarterly results by 2 to 10 percent (Table 10). Post-law claim frequencies for each of the next two calendar quarters increased by 4 to 14 percent over pre-law levels. For injuries exceeding $250, the first and second quarter 1985 post-law frequency declined by one and seven percent, respectively. The third and fourth quarter post-law claim frequencies increased by five and one percent, respectively. For the 1986 post-law quarterly results, only the first quarter's result showed a decrease relative to the pre-law results. For injury claims over $500, post-law 1985 results for the first and second quarters decreased by two to three percent, and the next two post-law calendar quarters increased by one or two percent relative to the pre-law results. The first quarter of 1986 had a result eight percent lower than the pre-law result. Injury frequencies for the other quarters increased by 7 to 12 percent. For injury claims above $1,000, the 1985 claim frequencies in all but the third quarter were about the same as the pre-law values. The post-law third quarter 1985 result was five percent higher than its pre-law corresponding result. Quarterly results for 1986 were 1 to 17 percent higher than the pre-law frequencies.

The percentage of collision claims with an associated injury claim are given in Table 11 for New Jersey. For all collisions, the results for pre-law and first post-law period were about the same. During the second post-law period, the percentage with injury claims increased by 4 to 13 percent. For collision claims exceeding $1,000, this percentage declined during the first post-law period by about one to four percent. For the second 12-month post-law period, it decreased by two to three percent for all injuries and injury claims over $250. Injury claims above $500 showed little change but for those above $1,000 there was about a five percent increase. Among collision claims greater than $3,000 and $5,000, the post-law percentages with injury declined by 0.5 to 9 percent. For the more severe collision damage claims ($3,000 and $5,000), the percentages with associated injury claims decreased for both post-law periods for all injury categories. Post-law reductions were usually greater for the first post-law period.

TABLE 7 Collision and Injury Claim Frequencies for New Jersey

	Pre-Law	Post-Law			
	Mar. 1984-Feb. 1985	Mar. 1985-Feb. 1986		Mar. 1986-Feb. 1987	
		Frequency	% Change	Frequency	% Change
Collision	11.3	11.8	+4	12.5	+11
Injury					
All	22.0	21.8	-1	22.7	+3
>$250	14.8	14.7	-1	15.2	+3
>$500	11.5	11.5	0	12.1	+5
>$1,000	8.7	8.9	+2	9.6	+10

TABLE 8 Youthful and No-Youthful Operator Age Group Claim Frequencies for New Jersey

	Pre-Law	Post-Law			
	Mar. 1984-Feb. 1985	Mar. 1985-Feb. 1986		Mar. 1986-Feb. 1987	
		Frequency	% Change	Frequency	% Change
Collision					
Youthful Operator Age Group*	17.0	18.4	+8	19.8	+16
No-Youthful Operator Age Group*	10.6	11.1	+5	11.7	+10
Injury					
Youthful Operator Age Group	34.1	33.2	-3	37.6	+10
No-Youthful Operator Age Group	20.7	20.6	0	21.1	+2

* Standardized for collision deductible group.

TABLE 9 Percentage Shoulder Belt Use by Car Drivers and Right Front-Seat Passengers* in New Jersey

	Pre-Law	Post-Law		
	November 1984	March 1985	July 1985	April 1986
Large Urban Areas				
Paramus	17	41	48	47
Hackensack	16	58	47	47
Passaic/Patterson	13	58	47	36
Montclair/Bloomfield	16	61	43	36
Oranges/Newark	24	56	53	40
Jersey City	15	55	52	48
Union	20	62	52	42
Elizabeth/Linden	14	54	46	38
Trenton	11	41	36	26
Camden	20	38	36	36
Small Cities				
Atlantic City	9	25	19	18
Vineland	8	33	23	20

* Passengers estimated to be under seven years old excluded.

TABLE 10 Injury Claim Frequencies by Quarter for New Jersey

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
All Injury Claims				
Pre-Law (1984)	21.6	23.8	20.2	23.0
Post-Law (1985)	20.4*	21.4	21.1	23.9
Change	-6%	-10%	+4%	+4%
Post-Law (1986)	20.3	23.3	23.1	23.9
Change	-6%	-2%	+14%	+4%
Injury Claims >$250				
Pre-Law (1984)	14.5	15.6	13.6	15.5
Post-Law (1985)	14.4*	14.5	14.3	15.6
Change	-1%	-7%	+5%	+1%
Post-Law (1986)	13.8	15.7	15.3	16.0
Change	-5%	+1%	+13%	+3%
Injury Claims >$500				
Pre-Law (1984)	11.6	11.7	10.8	12.2
Post-Law (1985)	11.2*	11.5	11.0	12.3
Change	-3%	-2%	+2%	+1%
Post-Law (1986)	10.7	12.6	12.1	13.1
Change	-8%	+8%	+12%	+7%
Injury Claims >$1,000				
Pre-Law (1984)	8.4	8.8	8.2	9.6
Post-Law (1985)	8.3*	8.8	8.6	9.5
Change	-1%	0%	+5%	-1%
Post-Law (1986)	8.5	9.9	9.6	10.4
Change	+1%	+13%	+17%	+8%

* Note: This quarterly claim frequency for New Jersey is based on one month of results following enactment of the law (March 1985) and two months prior to enactment (January and February 1985).

TABLE 11 Percentage of Collision Claims with Associated Injury Claims for New Jersey

	No. Collision Claims	Injury Claim Size			
		All	>$250	>$500	>$1,000
All Collisions					
Pre-Law	18,234	12.27	8.57	6.68	5.15
First Post-Law	29,079	12.25	8.50	6.78	5.29
Change		-0.2%	-0.8%	+1.5%	+2.7%
Second Post-Law	35,431	12.90	8.91	7.20	5.82
Change		+5.1%	+4.0%	+7.8%	+13.0%
Collisions >$1,000					
Pre-Law	9,952	19.93	13.89	10.80	8.33
First Post-Law	16,435	19.29	13.37	10.57	8.24
Change		-3.2%	-3.7%	-2.1%	-1.1%
Second Post-Law	20,821	19.54	13.47	10.87	8.72
Change		-2.0%	-3.0%	+0.6%	+4.7%
Collisions >$3000					
Pre-Law	3,125	41.53	29.73	23.20	18.09
First Post-Law	5,507	37.86	27.04	21.34	16.74
Change		-8.8%	-9.0%	-8.0%	-7.5%
Second Post-Law	6,983	39.55	28.08	22.48	18.00
Change		-4.8%	-5.5%	-3.1%	-0.5%
Collisions >$5,000					
Pre-Law	1,396	52.95	40.00	32.64	26.42
First Post-Law	2,539	50.74	37.52	30.22	24.07
Change		-4.2%	-6.2%	-7.4%	-8.9%
Second Post-Law	3,327	51.26	37.58	30.64	24.83
Change		-3.2%	-6.1%	-6.1%	-6.0%

Note: The pre-law period was March 1984 through February 1985; the first post-law period was March 1985 through February 1986; the second post-law period was March 1986 through February 1987.

Michigan

Michigan's mandatory belt usage law went into effect on July 1, 1985. For this study, the pre-law period extends from July 1, 1984 through June 30, 1985. The two post-law periods are July 1, 1985 through June 30, 1986 and July 1, 1986 through June 30, 1987.

Michigan's insurance claim results are presented in Table 12. Michigan's pre-law exposure was nearly 300,000 insured vehicle years; the first post-law period's exposure was slightly less than 470,000 insured vehicle years and the second post-law period's was about 540,000 insured vehicle years. Table 12 shows both of Michigan's post-law collision claim frequencies decreased (two and six percent) from the pre-law collision claim frequency. Post-law injury claim frequencies were 6 to 17 percent lower than the corresponding pre-law injury claim frequencies. These reductions occurred for both post-law periods. Although these reductions are impressive, the magnitude of the decreases are probably due to other factors in addition to the seat belt law.

Table 13 shows that Michigan's collision frequencies for the pre-law and first post-law period did not differ by operator age group. For both age groups, the first post-law period's injury results decreased by about six percent. Relative to the pre-law frequencies, collision claim frequencies for the second post-law period were 12 percent lower for the youthful operator age group and three percent lower for the no-youthful operator age group. Injury claim frequencies for this post-law period decreased 10 percent for the youthful operator group and 6 percent for the no-youthful operator group.

Front seat belt use in Michigan (Table 14) was estimated by UMTRI at about 60 percent for the first month of enforcement; thereafter, usage rates have consistently been near 45 percent for each of the follow-up surveys.

Because Michigan's law went into effect in July 1985, comparisons of the quarterly results start with the third calendar quarter (Table 15). Similar to Michigan's overall injury results, the post-law quarterly claim frequencies are, for the most part, considerably lower than the corresponding pre-law quarterly claim frequencies.

Table 16 displays percentages of collision claims with injury claims for Michigan's pre-law and post-law periods. During the first post-law period, the percentage of collision claims with injury claims decreased, and many of the reductions were substantial. During the second post-law period, in most cases the percentage of collision claims with associated injury claims also decreased; however, reductions in the second post-law period were usually smaller.

TABLE 12 Collision and Injury Claim Frequencies for Michigan

	Pre-Law	Post-Law			
	July 1984–June 1985	July 1985–June 1986		July 1986–June 1987	
		Frequency	% Change	Frequency	% Change
Collision	12.6	12.4	-2	11.9	-6
Injury					
All	12.9	12.1	-6	12.1	-6
>$250	6.3	5.5	-13	5.5	-13
>$500	4.5	3.8	-16	3.8	-16
>$1,000	2.9	2.4	-17	2.4	-17

TABLE 13 Youthful and No-Youthful Operator Age Group Claim Frequencies for Michigan

	Pre-Law	Post-Law			
	July 1984-June 1985	July 1985-June 1986		July 1986-June 1987	
		Frequency	% Change	Frequency	% Change
Collision					
Youthful Operator Age Group*	20.2	20.1	0	17.8	-12
No-Youthful Operator Age Group*	11.7	11.6	-1	11.3	-3
Injury					
Youthful Operator Age Group	19.6	18.5	-6	17.7	-10
No-Youthful Operator Age Group	12.2	11.4	-7	11.5	-6

* Standardized for collision deductible group.

TABLE 14 Percentage Shoulder Belt Use by Front Seat Occupants* in Michigan

Pre-Law		Post-Law						
		1985		1986			1987	
Dec. 1984	Apr. 1985	July	Dec.	Apr.	July	Dec.	Apr.	July
18	25	61	44	44	47	44	46	47

* Occupants age 16 and over.
Source: Wagenaar A., Molnar, L., and Businski, K. Direct Observation of Seat Belt Use in Michigan: July 1987. The University of Michigan Transportation Research Institute, September 1987. Figure 3.2, page 14.

TABLE 15 Injury Claim Frequencies by Quarter for Michigan

	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter
All Injury Claims				
Pre-Law (1984-85)	12.9	13.1	12.8	12.8
Post-Law (1985-86)	11.4	13.2	11.6	12.2
Change	-12%	+1%	-9%	-5%
Post-Law (1986-87)	12.9	12.9	11.0	11.6
Change	0%	-2%	-14%	-9%
Injury Claims >$250				
Pre-Law (1984-85)	6.3	6.7	6.0	6.3
Post-law (1985-86)	5.3	6.1	5.2	5.6
Change	-16%	-9%	-13%	-11%
Post-Law (1986-87)	6.0	6.0	5.3	4.6
Change	-5%	-10%	-12%	-27%
Injury Claims >$500				
Pre-Law (1984-85)	4.5	4.7	4.2	4.4
Post-Law (1985-86)	3.7	4.1	3.4	3.8
Change	-18%	-13%	-19%	-14%
Post-Law (1986-87)	4.2	4.2	3.7	3.1
Change	-7%	-11%	-12%	-30%
Injury Claims >$1,000				
Pre-Law (1984-85)	2.9	3.0	2.5	3.1
Post-Law (1985-86)	2.2	2.5	2.2	2.6
Change	-24%	-17%	-12%	-16%
Post-Law (1986-87)	2.8	2.8	2.3	2.0
Change	-3%	-7%	-8%	-35%

TABLE 16 Percentage of Collision Claims with Associated Injury Claims for Michigan

	No. Collision Claims	Injury Claim Size			
		All	>$250	>$500	>$1,000
All Collisions					
Pre-Law	36,162	6.28	3.06	2.15	1.36
First Post-Law	48,442	6.04	2.70	1.79	1.06
Change		-3.8%	-11.8%	-16.7%	-22.1%
Second Post-Law	43,057	7.11	3.20	2.20	1.36
Change		+13.2%	+4.6%	+2.3%	0%
Collisions >$1,000					
Pre-Law	14,402	13.85	6.74	4.73	2.99
First Post-Law	21,541	12.05	5.42	3.56	2.17
Change		-13.0%	-19.6%	-24.7%	-27.4%
Second Post-Law	21,066	13.19	5.93	4.12	2.59
Change		-4.8%	-12.0%	-12.9%	-13.4%
Collisions >$3,000					
Pre-Law	4,650	28.47	14.70	10.57	6.66
First Post-Law	7,030	24.86	11.42	7.64	4.78
Change		-12.7%	-22.3%	-27.7%	-28.2%
Second Post-Law	7,184	28.86	13.32	9.60	6.23
Change		+1.4%	-9.4%	-9.2%	-6.5%
Collisions >$5,000					
Pre-Law	2,449	34.38	18.42	13.69	8.85
First Post-Law	3,704	29.89	13.60	9.71	6.16
Change		-13.1%	-26.2%	-29.1%	-30.4%
Second Post-Law	3,655	36.86	17.71	13.05	8.76
Change		+7.2%	-3.9%	-4.7%	-1.0%

Note: The pre-law period was July 1984 to June 1985; the first post-law period was July 1985 to June 1986; the second post-law period was July 1986 to June 1987.

Texas

Texas' mandatory seat belt law went into effect September 1, 1985; however, only warnings were issued until December 1, 1985 when fines were initially enforced. Thus, for this study the 12-month period specified as post-law covered December 1985 through November 1986. The pre-law period was December 1984 through November 1985.

Texas' pre-law and post-law results were based on nearly 640,000 insured vehicle years and 940,000 insured vehicle years, respectively. Table 17 shows that the post-law collision claim frequency increased four percent over the pre-law collision result. Relative to the pre-law results, Texas' post-law injury claim frequencies increased 6 percent for all injury claims, 7 percent for injury claims greater than $250, 11 percent for injury claims greater than $500, and 15 percent for claims exceeding $1,000.

Table 18 presents collision and injury claim frequencies by operator age group. Texas' post-law collision frequencies of both age groups increased by about three percent relative to the pre-law claim frequencies. For the youthful operator age group, the post-law injury claim frequency was 11 percent higher than the pre-law claim frequency. For the no-youthful operator age group, the post-law injury claim frequency was five percent higher than the pre-law result.

As shown in Table 19, the IIHS seat belt use surveys conducted in Texas found, in general, higher sustained levels of belt usage than in either New York or New Jersey.

Because Texas' penalty became effective December 1, 1985, comparisons of the quarterly results begin with the fourth quarter (Table 20). For all injury claims, the post-law quarterly claim frequencies increased by 4 to 10 percent over the pre-law results. For the three injury claim size categories, the first two post-law quarterly claim frequencies (the fourth quarter of 1985 and first quarter of 1986) showed small reductions or no change. The next two post-law quarters (the second and third quarters of 1986) had injury claim frequencies that were 9 to 33 percent higher than their corresponding pre-law quarterly results. The small decreases followed by large increases in the post-law claim frequencies for Texas are surprising in light of the high belt usage patterns observed in that state.

The percentage of collision claims with associated injury claims increased for all claim size categories in the post-law period in Texas (Table 21).

TABLE 17 Collision and Injury Claim Frequencies for Texas

	Pre-Law	Post-Law	
	Dec. 1984-Nov. 1985	Dec. 1985-Nov. 1986	Percent Change
Collision	10.1	10.5	+4
Injury			
All	15.3	16.2	+6
>$250	9.7	10.4	+7
>$500	7.3	8.1	+11
>$1,000	5.2	6.0	+15

TABLE 18 Youthful and No-Youthful Operator Age Group Claim Frequencies for Texas

	Pre-Law	Post-Law	
	Dec. 1984-Nov. 1985	Dec. 1985-Nov. 1986	Percent Change
Collision			
Youthful Operator Age Group*	16.7	17.2	+3
No-Youthful Operator Age Group*	9.4	9.8	+4
Injury			
Youthful Operator Age Group	21.7	24.0	+11
No-Youthful Operator Age Group	14.6	15.3	+5

* Standardized for collision deductible group.

TABLE 19 Percentage Shoulder Belt Use by Car Drivers and Right Front-Seat Passengers* in Texas

	Pre-Law	Post-Law			
	July 1985	Dec. 1985	April 1986	Sept. 1986	Sept. 1987
Large Cities					
Dallas	18	64	68	66	63
Houston	18	57	70	69	61
San Antonio	11	50	55	47	47
Amarillo	6	43	63	54	53
Lubbock	11	48	59	49	48
El Paso	6	42	52	43	39
Small Cities					
Midland	18	52	56	56	45
San Angelo	14	47	54	51	55
Victoria	15	52	65	57	56
Intercity	28	65	67	66	64

* Passengers estimated to be under four years old excluded.

TABLE 20 Injury Claim Frequencies by Quarter for Texas

	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter
All Injury Claims				
Pre-Law (1984-85)	14.8	14.0	15.6	15.4
Post-Law (1985-86)	16.2*	14.6	17.2	16.6
Change	+9%	+4%	+10%	+8%
Injury Claims >$250				
Pre-Law (1984-85)	10.2	9.3	10.1	9.5
Post-Law (1985-86)	9.9*	9.1	11.0	10.8
Change	-3%	-2%	+9%	+14%
Injury Claims >$500				
Pre-Law (1984-85)	7.6	7.1	7.6	7.1
Post-Law (1985-86)	7.5*	7.0	8.3	8.5
Change	-1%	-1%	+9%	+20%
Injury Claims >$1,000				
Pre-Law (1984-85)	5.6	5.0	5.3	4.9
Post-Law (1985-86)	5.4*	5.0	6.0	6.5
Change	-4%	0%	+13%	+33%

* Fine was enforced beginning in December 1985.

TABLE 21 Percentage of Collision Claims with Associated Injury Claims for Texas

	No. Collision Claims	Injury Claim Size			
		All	>$250	>$500	>$1,000
All Collisions					
Pre-Law	61,923	8.56	5.11	3.63	2.47
Post-Law	71,072	9.52	5.71	4.31	3.08
Change		+11.2%	+11.7%	+18.7%	+24.7%
Collisions >$1,000					
Pre-Law	32,518	14.85	8.94	6.36	4.32
Post-Law	38,930	15.94	9.59	7.21	5.15
Change		+7.3%	+7.3%	+13.4%	+19.2%
Collisions >$3,000					
Pre-Law	10,135	33.29	21.24	15.28	10.42
Post-Law	12,753	34.75	21.70	16.62	11.92
Change		+4.4%	+2.2%	+8.8%	+14.4%
Collisions >$5,000					
Pre-Law	4,722	47.92	31.95	23.95	17.01
Post-Law	5,953	49.73	33.08	26.18	19.28
Change		+3.8%	+3.5%	+9.3%	+13.3%

Note: The pre-law period was December 1984 through November 1985; the post-law period was December 1985 through November 1986.

Connecticut

Connecticut's mandatory usage law went into effect on January 1, 1986; however, fines were not imposed until February 1, 1986. For Connecticut, the post-law period was February 1, 1986 through January 31, 1987 and the pre-law period was February 1, 1985 through January 31, 1986. The pre-law and post-law results are based on approximately 180,000 insured vehicle years and 250,000 insured vehicle years of exposure, respectively.

Connecticut's overall collision and injury claim frequencies are presented in Table 22. The post-law collision claim frequency was similar to the pre-law collision claim frequency. Post-law injury claim frequencies were about five percent lower than the corresponding pre-law result for all injury claims and for injury claims exceeding $250 and $500. For injury claims above $1,000, there was a small increase during the post-law period.

The collision claim frequency in Connecticut for youthful operators decreased by two percent during the post-law period (Table 23). For the no-youthful operator group, the post-law collision frequency increased by one percent. Post-law injury claim frequencies for both age groups decreased by five percent.

For all injury claims, the post-law quarterly claim frequency increased by two percent in the first quarter but decreased by six to eleven percent in the next three quarters (Table 24). For injury claims above $250, the post-law quarterly frequency increased by one percent in the first quarter and decreased by 3 to 12 percent in the next three quarters. For injury claims over $500, the second and third quarters had 11 to 12 percent reductions in the post-law period; the first and fourth quarters showed little change. For injury claims over $1,000, the post-law quarterly frequency increased by two percent in the first quarter, decreased by 10 to 12 percent in the second and third quarters, and increased by 12 percent in the fourth quarter.

The percentage of collision claims with associated injury claims generally decreased in the post-law period in Connecticut (Table 25). For all collision claims, collisions greater than $1,000, and collisions greater than $3,000 with associated injury claims over $1,000, this percentage increased post-law.

TABLE 22 Collision and Injury Claim Frequencies for Connecticut

	Pre-Law	Post-Law	
	Feb. 1985-Jan. 1986	Feb. 1986-Jan. 1987	Percent Change
Collision	10.4	10.5	+1
Injury			
All	20.2	19.2	-5
>$250	11.1	10.7	-4
>$500	7.9	7.5	-5
>$1,000	5.1	5.2	+2

TABLE 23 Youthful and No-Youthful Operator Age Group Claim Frequencies for Connecticut

	Pre-Law	Post-Law	
	Feb. 1985-Jan. 1986	Feb. 1986-Jan. 1987	Percent Change
Collision			
Youthful Operator Age Group*	15.5	15.2	-2
No-Youthful Operator Age Group*	9.9	10.0	+1
Injury			
Youthful Operator Age Group	31.4	29.7	-5
No-Youthful Operator Age Group	18.9	18.0	-5

* Standardized for collision deductible group.

TABLE 24 Injury Claim Frequencies by Quarter for Connecticut

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
All Injury Claims				
Pre-Law (1984)	18.0	20.3	20.0	22.2
Post-Law (1985)	18.3	19.1	17.8	20.2
Change	+2%	-6%	-11%	-9%
Injury Claims >$250				
Pre-Law (1984)	10.2	11.5	11.0	11.7
Post-Law (1985)	10.3	10.6	9.7	11.3
Change	+1%	-8%	-12%	-3%
Injury Claims >$500				
Pre-Law (1984)	7.4	7.9	7.7	8.1
Post-Law (1985)	7.3	7.0	6.8	8.1
Change	-1%	-11%	-12%	0%
Injury Claims >$1,000				
Pre-Law (1984)	5.0	5.2	5.2	5.2
Post-Law (1985)	5.1	4.7	4.6	5.8
Change	+2%	-10%	-12%	+12%

TABLE 25 Percentages of Collision with Associated Injury Claims for Connecticut

	No. Collision Claims	Injury Claim Size			
		All	>$250	>$500	>$1,000
All Collisions					
Pre-Law	16,011	10.93	6.24	4.41	2.82
Post-Law	18,654	10.55	5.95	4.20	3.03
Change		-3.5%	-4.6%	-4.8%	+7.4%
Collisions >$1,000					
Pre-Law	9,257	17.52	10.06	7.13	4.57
Post-Law	11,176	16.04	9.14	6.50	4.64
Change		-8.4%	-9.1%	-8.8%	+1.5%
Collisions >$3,000					
Pre-Law	3,31[illegible]	34.92	21.12	15.40	9.98
Post-Law	4,109	32.69	19.83	14.20	10.11
Change		-6.4%	-6.1%	-7.8%	+1.3%
Collisions >$5,000					
Pre-Law	1,662	46.41	29.55	21.80	15.17
Post-Law	1,998	44.52	28.48	20.72	14.81
Change		-4.1%	-3.6%	-5.0%	-2.4%

Note: The pre-law period was February 1985 through January 1986; the post-law period was February 1986 through January 1987.

Florida

Florida's mandatory belt usage law went into effect on July 1, 1986. However, Florida's fine of $20 did not become effective until January 1, 1987. The pre-law period for this study is July 1, 1985 through June 30, 1986 and the post-law period covers July 1, 1986 through June 30, 1987. The results for the pre-law period are based on approximately 990,000 insured vehicle years of exposure and the post-law period results are based on more than 1.2 million insured vehicle years of exposure.

Florida's overall collision and injury claim frequency results are presented in Table 26. The post-law collision claim frequency decreased slightly from the pre-law frequency. For all injury claims, the post-law frequency decreased two percent relative to the pre-law frequency. The post-law injury claim frequency decreased by one percent for claims above $250, remained the same for claims over $500, and increased by one percent for claims over $1,000.

The post-law collision claim frequency for youthful operators decreased by three percent relative to the pre-law frequency (Table 27). The post-law injury claim frequency also dropped by three percent for the youthful age group. For the no-youthful operator age group, pre-law and post-law collision frequencies remained the same and the post-law injury claim frequency decreased by two percent.

Because Florida's law went into effect July 1, 1986, post-law quarterly values start with the third calendar quarter. For all injury claims, the third calendar quarter of the pre-law and post-law periods showed no change (Table 28). The next three successive quarters had post-law frequencies that were one to three percent lower than their corresponding pre-law values. For injury claims above $250, post-law quarterly results ranged from a four percent increase to a two percent decrease. The four percent increase occurred for the initial calendar quarter of the post-law period. For injury claims over $500, the post-law quarterly injury frequencies increased by five percent for the third quarter, remained the same for the fourth quarter, increased by two percent in the first quarter, and decreased by two percent in the second quarter. For the more severe injuries above $1,000, the post-law quarterly frequencies either remained the same or were higher than the pre-law frequencies.

In almost all cases, the post-law percentages of collision claims with injury claims for Florida increased relative to the pre-law values (Table 29).

TABLE 26 Collision and Injury Claim Frequencies for Florida

	Pre-Law	Post-Law	
	July 1985-June 1986	July 1986-June 1987	Percent Change
Collision	8.8	8.7	-1
Injury			
All	20.5	20.1	-2
>$250	13.1	13.0	-1
>$500	10.0	10.0	0
>$1,000	7.6	7.7	+1

TABLE 27 Youthful and No-Youthful Operator Age Group Claim Frequencies for Florida

	Pre-Law July 1985-June 1986	Post-Law July 1986-June 1987	Percent Change
Collision			
Youthful Operator Age Group*	15.2	14.8	-3
No-Youthful Operator Age Group*	8.1	8.1	0
Injury			
Youthful Operator Age Group	35.1	34.1	-3
No-Youthful Operator Age Group	18.9	18.5	-2

* Standardized for collision deductible group.

TABLE 28 Injury Claim Frequencies by Quarter for Florida

	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter
All Injury Claims				
Pre-Law (1985-86)	20.2	21.0	20.3	20.5
Post-Law (1986-87)	20.1	20.4	19.6	20.3
Change	0%	-3%	-3%	-1%
Injury Claims >$250				
Pre-Law (1985-86)	12.7	13.5	13.0	13.3
Post-Law (1986-87)	13.2	13.5	12.8	13.0
Change	+4%	0%	-2%	-2%
Injury Claims >$500				
Pre-Law (1985-86)	9.6	10.3	9.9	10.2
Post-Law (1986-87)	10.1	10.3	10.1	10.0
Change	+5%	0%	+2%	-2%
Injury Claims >$1,000				
Pre-Law (1985-86)	7.1	7.7	7.6	7.7
Post-Law (1986-87)	7.9	8.0	7.6	7.9
Change	+11%	+4%	0%	+3%

TABLE 29 Percentage of Collision Claims with Associated Injury Claims for Florida

	No. Collision Claims	Injury Claim Size			
		All	>$250	>$500	>$1000
All Collisions					
Pre-Law	70,903	13.14	8.59	6.56	5.01
Post-Law	70,733	13.82	9.28	7.18	5.49
Change		+5.2%	+8.0%	+9.5%	+9.6%
Collisions >$1,000					
Pre-Law	34,592	23.46	15.43	11.72	8.89
Post-Law	37,433	23.10	15.59	12.01	9.22
Change		-1.5%	+1.0%	+2.5%	+3.7%
Collisions >$3,000					
Pre-Law	11,740	44.10	30.59	23.77	18.02
Post-Law	12,799	43.89	31.76	24.92	19.08
Change		-0.5%	+3.8%	+4.8%	+5.9%
Collisions >$5,000					
Pre-Law	5,408	56.82	42.11	33.97	25.99
Post-Law	5,925	57.18	43.10	35.14	27.85
Change		+0.6%	+2.4%	+3.4%	+7.2%

Note: The pre-law period was July 1985 through June 1986; the post-law period was July 1986 through June 1987.

Kansas

Kansas' mandatory belt usage law went into effect July 1, 1986. However, its $10 fine for violations was not imposed until July 1, 1987. For this study, the pre-law period extends from July 1, 1985 through June 30, 1986 and the post-law period runs from July 1, 1986 through June 30, 1987. Pre-law and post-law results are based on about 120,000 and 150,000 insured vehicle years of exposure, respectively.

Table 30 presents Kansas' overall collision and injury claim frequencies for the specified pre-law and post-law periods. The post-law collision claim frequency was similar to the pre-law value. Each of the injury claim categories showed an increase in the post-law period — 3 percent for all injuries, 14 percent for injuries above $250, and more than 20 percent for injury claims over $500 and $1,000.

For the youthful operator age group, the post-law collision claim frequency increased three percent over the pre-law collision result (Table 31). The post-law injury claim frequency for the youthful age group increased by 23 percent relative to its pre-law value. Collision and injury frequencies for the no-youthful operator age group varied only slightly for the specified pre-law and post-law periods.

Because Kansas' post-law period began July 1, 1986, quarterly results are presented beginning with the third calendar quarter. For the most part, post-law quarterly frequencies increased over pre-law values for corresponding calendar quarters (Table 32). The third and fourth quarters had some post-law injury frequencies that decreased; however, the decreases were no where near as large in magnitude as some of the increases.

The post-law percentages of collision claims with associated injury claims were generally quite a bit greater than those for pre-law period in Kansas (Table 33).

TABLE 30 Collision and Injury Claim Frequencies for Kansas

	Pre-Law	Post-Law	
	July 1985-June 1986	July 1986-June 1987	Percent Change
Collision	8.9	9.0	+1
Injury			
All	14.2	14.6	+3
>$250	7.0	8.0	+14
>$500	4.3	5.3	+23
>$1,000	2.7	3.3	+22

TABLE 31 Youthful and No-Youthful Operator Age Group Claim Frequencies for Kansas

	Pre-Law	Post-Law	
	July 1985-June 1986	July 1986-June 1987	Percent Change
Collision			
Youthful Operator Age Group*	14.9	15.4	+3
No-Youthful Operator Age Group*	8.2	8.3	+1
Injury			
Youthful Operator Age Group	21.9	27.0	+23
No-Youthful Operator Age Group	13.4	13.3	-1

* Standardized for collision deductible group.

TABLE 32 Injury Claim Frequencies by Quarter for Kansas

	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter
All Injury Claims				
Pre-Law (1985-86)	15.3	17.3	11.5	13.3
Post-Law (1986-87)	15.5	15.9	12.0	15.3
Change	+1%	-8%	+4%	+15%
Injury Claims >$250				
Pre-Law (1985-86)	7.5	7.7	6.2	6.7
Post-Law (1986-87)	7.4	8.8	6.7	9.5
Change	-1%	+14%	+8%	+42%
Injury Claims >$500				
Pre-Law (1985-86)	4.9	4.9	3.6	4.0
Post-Law (1986-87)	4.6	5.9	4.6	6.6
Change	-6%	+20%	+28%	+65%
Injury Claims >$1,000				
Pre-Law (1985-86)	3.1	3.1	2.2	2.5
Post-Law (1986-87)	2.9	3.9	3.0	4.0
Change	-6%	+26%	+36%	+60%

TABLE 33 Percentage of Collision Claims with Associated Injury Claims for Kansas

	No. Collision Claims	Injury Claim Size			
		All	>$250	>$500	>$1000
All Collisions					
Pre-Law	8,573	8.84	4.80	3.15	1.96
Post-Law	8,259	9.57	5.92	4.01	2.56
Change		+8.3%	+23.3%	+27.3%	+30.6%
Collisions >$1,000					
Pre-Law	3,540	19.25	10.62	6.87	4.29
Post-Law	3,681	19.24	12.09	8.27	5.30
Change		-0.1%	+13.8%	+20.4%	+23.5%
Collisions >$3,000					
Pre-Law	1,127	42.25	25.68	17.59	11.08
Post-Law	1,174	43.14	29.01	20.51	14.16
Change		+2.1%	+13.0%	+16.6%	+27.8%
Collisions >$5,000					
Pre-Law	537	54.41	34.35	24.87	16.66
Post-Law	593	59.10	41.31	29.86	22.47
Change		+8.6%	+20.3%	+20.1%	+34.9%

Note: The pre-law period was July 1985 through June 1986; the post-law period was July 1986 through June 1987.

Maryland

Maryland's mandatory belt usage law went into effect July 1, 1986. For this study, Maryland's pre-law period extends from July 1, 1985 through June 30, 1986, and the post-law period runs from July 1, 1986 through June 30, 1987. Pre-law and post-law results are based on approximately 460,000 and 515,000 insured vehicle years of exposure, respectively.

Table 34 summarizes Maryland's overall collision and injury claim frequencies for the pre-law and post-law periods. The post-law collision claim frequency increased by three percent relative to the preceding pre-law period. For all injury claims and injury claims over $250, the pre-law and post-law results did not change. For injury claims above $500 and $1,000, the post-law injury frequencies increased by three and eight percent, respectively.

For the youthful operator age group, post-law collision and injury claim frequencies both increased by two percent over the corresponding pre-law result (Table 35). For the no-youthful operator age group, the post-law collision claim frequency was four percent greater than its pre-law result. The pre-law and post-law injury claim frequencies were similar for the no-youthful operator age group.

Because Maryland's post-law period began July 1, 1986, quarterly results are presented beginning with the third calendar quarter (Table 36). For all injury claims and injuries over $250, the post-law quarterly claim frequencies both increased and decreased relative to the corresponding pre-law values. For injury claims above $500 and $1,000, the post-law results were, for the most part, greater than the pre-law values.

Table 37 presents Maryland's pre-law and post-law percentages of collision claims having injury claims. Regardless of the size of the collision claim, for injury claims greater than $250, $500, and $1,000 this percentage increased in the post-law period.

TABLE 34 Collision and Injury Claim Frequencies for Maryland

	Pre-Law	Post-Law	
	July 1985-June 1986	July 1986-June 1987	Percent Change
Collision	9.0	9.3	+3
Injury			
All	23.4	23.3	0
>$250	16.0	16.0	0
>$500	13.1	13.5	+3
>$1,000	9.2	9.9	+8

TABLE 35 Youthful and No-Youthful Operator Age Group Claim Frequencies for Maryland

	Pre-Law	Post-Law	
	July 1985-June 1986	July 1986-June 1987	Percent Change
Collision			
Youthful Operator Age Group*	14.7	15.0	+2
No-Youthful Operator Age Group*	8.4	8.7	+4
Injury			
Youthful Operator Age Group	34.9	35.7	+2
No-Youthful Operator Age Group	22.1	22.0	0

* Standardized for collision deductible group.

TABLE 36 Injury Claim Frequencies by Quarter for Maryland

	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter
All Injury Claims				
Pre-Law (1985-86)	21.7	27.0	21.6	23.1
Post-Law (1986-87)	22.6	24.2	21.1	25.6
Change	+4%	-10%	-2%	+11%
Injury Claims >$250				
Pre-Law (1985-86)	15.6	17.8	14.5	16.3
Post-Law (1986-87)	16.2	17.6	14.9	15.5
Change	+4%	-1%	+3%	-5%
Injury Claims >$500				
Pre-Law (1985-86)	12.7	14.7	11.7	13.5
Post-Law (1986-87)	13.6	15.2	12.7	13.2
Change	+7%	+3%	+9%	-2%
Injury Claims >$1,000				
Pre-Law (1985-86)	8.5	10.3	8.1	9.7
Post-Law (1986-87)	10.2	11.0	9.4	10.1
Change	+20%	+7%	+16%	+4%

TABLE 37 Percentage of Collision Claims with Associated Injury Claims for Maryland

	No. Collision Claims	Injury Claim Size			
		All	>$250	>$500	>$1,000
All Collisions					
Pre-Law	35,776	12.61	7.96	6.28	4.35
Post-Law	32,212	13.01	8.82	7.10	5.25
Change		+3.2%	+10.8%	+13.1%	+20.7%
Collisions >$1,000					
Pre-Law	17,504	21.90	13.71	10.76	7.48
Post-Law	16,867	21.28	14.35	11.41	8.56
Change		-2.8%	+4.7%	+6.0%	+14.4%
Collisions >$3,000					
Pre-Law	5,510	43.76	28.21	22.33	16.22
Post-Law	5,492	42.34	29.51	23.22	17.92
Change		-3.2%	+4.6%	+4.0%	+10.5%
Collisions >$5,000					
Pre-Law	2,630	56.09	36.54	30.12	23.46
Post-Law	2,614	56.34	40.71	33.01	26.17
Change		+0.4%	+11.4%	+9.6%	+11.6%

Note: The pre-law period was July 1985 through June 1986; the post-law period was July 1986 through June 1987.

DISCUSSION

Despite increased use of seat belts following adoption of state seat belt use laws and the known injury reduction benefits of seat belt use, no clear cut pattern of reductions in no fault injury claims was found. It is well established that using seat belts substantially reduces the likelihood of death or serious injury in a crash, and seat belt use has increased since the passage of state seat belt laws; thus, these results are disappointing. Several explanations for the limited effect of state seat belt laws on insurance injury losses are possible.

Belts are much less effective in preventing relatively minor injuries than serious and fatal injuries, and many insurance injury claims are for less serious injuries. Some of these injuries, although minor, may produce relatively expensive medical bills; for example, a cervical sprain may require repeated physiotherapy treatments. Further, a comprehensive study of injury patterns in hospitals in the United Kingdom, before and after their seat belt law, reported that the frequency of cervical sprains increased dramatically after the belt law.[3] Thus, it is possible that the beneficial effect of belt laws on more serious injuries is being masked by injury claims measurements that are determined by the size of medical bills rather than the severity of the injuries per se.

It is also important to note that the injury claim frequencies reported here are based on any injury claimed by any occupant that results in a medical bill. In the studies showing the effects of belt laws on deaths and serious injuries, the researchers have been able to carefully separate out those occupants covered by the laws; for example, rear seat occupants are not covered in 26 of the 31 jurisdictions with belt laws. It is not possible to identify seating locations of injured persons with the less detailed HLDI insurance claims data.[4-8] In each of these studies, the authors also have used various techniques (most commonly time series methods) to project the expected numbers of fatalities that would have occurred without laws and compared them with the actual numbers. Such projections are necessary because normal year-to-year fluctuations can easily mask the relatively small effects of the belt laws.

In the present study, it was not possible to develop injury claim frequencies for the several years prior to the adoption of belt laws that would have been necessary for reliable time series projections. Therefore, because only simple before and after comparisons were possible, relatively small effects could easily have been masked by normal year-to-year fluctuations. Finally, the present study was confined to injury claims in relatively new cars and belt use is known to be higher among operators of new cars than among the overall vehicle population. Thus, the increases in belt use in such vehicles resulting from state mandatory use laws is likely to be smaller, which in turn means that the potential injury reductions will also be smaller.

Although there is convincing evidence now from several studies on the overall benefits of state belt use laws in reducing the expected frequency of serious and fatal injuries, the present study found no unambiguous evidence that such laws have had an impact on personal injury protection insurance claims among occupants of recent model year vehicles.

REFERENCES

1. Williams, A., Wells, J., and Lund, A. Shoulder Belt Use in Four States with Belt Use Laws. *Accident Analysis and Prevention*. Vol. 19, No. 4, pp. 251-260, 1987.

2. Wagenaar A., Molnar, L., and Businski, K. Direct Observation of Seat Belt Use in Michigan: July 1987. The University of Michigan Transportation Research Institute, September 1987.

3. Rutherford, W. Greenfield, T, Hayes, H., and Nelson, J. *The Medical Effects of Seat Belt Legislation in the United Kingdom*. Department of Health and Social Security, Office of the Chief Scientist, Research Report No. 13.

4. Campbell, B.J., and Campbell, F.A. *Seat Belt Law Experience in Four Foreign Countries compared to the United States*. AAA Foundation for Traffic Safety, Falls Church, VA 1986.

5. Campbell, B.J., Stewart, J.R., and Campbell, F.A. *1985-1986 Experience with Belt Use Laws in the United States*. University of North Carolina Highway Safety Research Center, Chapel Hill, NC, 1987.

6. Hoxie, P. and Skinner, D. *Fatality Reductions from Mandatory Seatbelt Usage Laws*. Transportation Systems Center, Cambridge, MA, 1987.

7. Lund, A.K., Zador, P.L., and Pollner, J. Motor Vehicle Occupant Fatalities in Four States with Seat Belt Use Laws. SAE Technical Paper 870224. Warrendale, PA: Society of Automotive Engineers, 1987.

8. Wagenaar, A.C., Maybee, R.G., and Sullivan, K.P. *Effects of Mandatory Seatbelt Laws on Traffic Fatalities in the United States*. University of Michigan Transportation Research Institute, Ann Arbor, 1987.

APPENDIX A Standardization

Insurance loss experience varies in relation to certain nonvehicle factors. With respect to Personal Injury Protection (PIP) coverages, one important factor that influences loss experience is operator age. Youthful operators generally have worse loss experience than older drivers. Thus, the proportions of youthful operators must be taken into consideration in comparing the loss experience of different vehicles.

To minimize any biases that could result because of variations among different vehicles in an operator age group, the PIP coverage results for the vehicles in this study were weighted, or standardized, to produce a weighted average of actual results. The weights used in the standardization procedure are shown below.

Operator Age Group	Distribution
Youthful	0.10
No-Youthful	0.90

With respect to collision coverages, both the frequency and average size of collision losses vary with the deductible amount and the age group of the operators. Therefore, collision coverage results for the vehicles in this study were standardized using the weights shown below.

Deductible	Youthful Operator	No Youthful Operator
$<$ \$150	0.05	0.50
$\geq$ \$150	0.05	0.40

Standardizing on these nonvehicle factors ensures that the mix is the same for each result. Therefore to the extent that age distributions within each operator age group and amounts within each deductible group do not vary substantially for different vehicles, these effects will not bias comparisons amoung the various results. The standardization procedure employed is widely used in health statistics.* The basic principle of the method is the introduction of a selected population with a standard distribution across operator age group or across the combination of operator age group and deductibles, as represented by the standardization weights in the tables.

*For example, see Armitage, P. Statistical Methods in Medical Research. Wiley, New York (1971).

APPENDIX B Definitions

Collision Claim Frequency — The number of claims for a group of vehicles, divided by the exposure for that group; expressed as claims per one hundred insured vehicle years.

Collision Coverages — As defined in insurance contracts, the coverage under which people insure their own vehicle against loss caused by collision.

Deductible Amount — That portion of the collision damage cost borne by the policyholder. For computing results, deductible amounts are split into two groups; less than \$150 (mainly \$50 and \$100 deductibles) and greater than or equal to \$150 (mainly \$200 and \$250 deductibles).

Exposure — The time interval an individual vehicle is insured. Exposure for a group of vehicles is expressed in units of insured vehicle years.

Personal Injury Protection (PIP) Claim Frequency — The number of claims for a group of vehicles, divided by the exposure for that group; expressed as claims per one thousand insured vehicle years.

Personal Injury Protection Coverage — First-party no-fault coverage in which an insurer pays, within the specified limits, the medical, hospital, and other expenses of the insured, others in his vehicle, and pedestrians struck by him.

Operator Age Group — The factor that distinguishes those vehicles whose rated driver is youthful from those vehicles whose rated driver is not youthful (see Youthful Operator).

Rated Driver — The driver considered to represent the greatest risk for the policyof an insured vehicle.

Youthful Operator — For the purposes of this report, all males (married or single) under 25 years of age and all unmarried females under 25 years of age.

APPENDIX C Adjustment Procedure for Claim Reporting Delays

Payments on injury claims may occur over a number of months. The claim size amount and length of time needed for claims to become final are both affected by the required course(s) of medical treatment, as well as, how quickly claims are submitted and processed. These unknown factors can result in some claims not being included at a particular time in the calculation of claim frequencies for specified periods of interest. In this study, pre-law periods are affected less than the post-law periods because more time has passed for claims to be counted and the claim amount mature in the pre-law period. Stated differently, pre-law claims are older than post-law claims. Because this accounting delay could affect the claim frequencies calculated for specific pre-law, post-law, or quarterly periods of interest, an empirically based investigation was undertaken to estimate proportions of claims processed in the HLDI system at various monthly claim ages. Proportions were estimated for all injury claims, and injury claims over $250, $500, and $1,000. The monthly claim age proportions were estimated from the set of claims occurring between October 1982 and December 1983 for the oldest model year included in the study — 1983. For example, out of the 14,877 injury claims occurring during that period, 95.1 percent of those claims were part of HLDI's processing system within six months of when the injury took place. That is, 4.9 percent of those claims had not been processed within six months of the injury claim's occurrence. Thus, if a specified period includes a calendar month for which claims are at most six months old, then for that month the number of injury claims was adjusted to account for the fact that only 95.1 percent of the injury claims was available. (Monthly proportions were also estimated for claims occurring between October 1983 and December 1984 for the next oldest model year included in the study — 1984. Using a statistical procedure known as the Kolmogorov-Smirnov 2 sample test, no statistical difference was found between the cumulative distributions of the two model years.)

The adjustment procedure that was used is illustrated for Michigan's pre-law and post-law fourth quarter periods (October through December of 1984, 1985, and 1986). Injury claims occurring within any of the individual months are a specified number of months old relative to the current end date of insurance losses being processed. In this report, the last month for which claims were processed was September 1987, therefore, June 1987 claims are three months old. Similarly, the fourth quarter of 1986 has monthly claims that are 9 months old (claims for December 1986), 10 months old (claims for November 1986), and 11 months old (claims for October 1986). Similarly, for the fourth quarters of 1985 and 1984, monthly claims are 21 to 23 months old and 33 to 35 months old, respectively.

Table C-1 below presents monthly cumulative proportions for the months of the fourth quarter of 1984, 1985, and 1986 estimated from the claim age distribution for model year 1983.

TABLE C-1

Calendar Month	Claim Age	Cumulative Proportion
October 1984	35	0.9987
November 1984	34	0.9985
December 1984	33	0.9979
October 1985	23	0.9909
November 1985	22	0.9905
December 1985	21	0.9899
October 1986	11	0.9784
November 1986	10	0.9755
December 1986	9	0.9716

These estimated monthly cumulative proportions were combined on a quarterly basis for Michigan by calculating a weighted average of the proportions using Michigan's actual number of all injury claims for the months of interest. Table C-2 provides the actual number of all injury claims in Michigan for each of the months of interest.

TABLE C-2

Calendar Month	Cumulative Proportion	Actual Number of All Injury Claims in Michigan
October 1984	0.9987	297
November 1984	0.9985	312
December 1984	0.9979	302
October 1985	0.9909	494
November 1985	0.9905	502
December 1985	0.9899	534
October 1986	0.9784	647
November 1986	0.9755	574
December 1986	0.9716	555

Thus, the pre-law fourth quarter 1984 weighted average was calculated as

$$[(0.9987)(297) + (0.9985)(312) + (0.9979)(302)]/(297 + 312 + 302) = 0.9984$$

Thus, we estimate the number of pre-law quarterly injury claims was low by 0.16 percent and accordingly adjust the actual quarterly result. Similarly, the post-law fourth quarter 1985 weighted average was calculated as

$$[(0.9909)(494) + (0.9905)(502) + (0.9899)(534)]/(494 + 502 + 534) = 0.9904$$

For the post-law quarter 1986, the weighted average was calculated as

$$[(0.9784)(647) + (0.9755)(574) + (0.9716)(555)]/(647 + 574 + 555) = 0.9753$$

The fourth quarter 1985 and 1986 injury claims were estimated to be low by 0.96 percent and 2.47 percent, respectively. Injury frequency results were adjusted by dividing the actual value by the weighted cumulative proportions.

This method of adjustment was applied to measures of injury frequency for all injury claims, and injury claims exceeding $250, $500, and $1,000 for the results of quarterly and twelve month calendar periods.

HLDI Publications

Research reports published by the Highway Loss Data Institute are:

R72-1 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1972 Models,* June 1973.

R73-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1973 Models Compared with 1972 Models,* September 1973.

R73-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models,* March 1974.

R73-3 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models During Their First Two Years,* December 1974.

R73-4 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models During Their First Three Years,* December 1975.

R74-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1974 Models,* May 1974.

R74-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1974 Models During Their First Year,* December 1974.

R74-3 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1974 Models During Their First Two Years,* December 1975.

R75-1 *Automobile Insurance Losses, Collision Coverages, Initial Results for 1975 Models,* July 1975.

R75-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1975 Models During Their First Year,* December 1975.

R76-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1976 Models,* June 1976.

R76-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1976 Models During Their First Year, 1975 Models During Their First Two Years, 1974 Models During Their First Three Years,* December 1976.

R77-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1977 Models,* June 1977.

R77-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1977 Models During Their First Year, 1976 Models During Their First Two Years, 1975 Models During Their First Three Years,* December 1977.

R78-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1978 Models,* June 1978.

R78-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series. 1978 Models During Their First Year, 1977 Models During Their First Two Years, 1976 Models During Their First Three Years,* January 1979.

R79-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1979 Models,* June 1979.

R79-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1979 Models During Their First Year, 1978 Models During Their First Two Years, 1977 Models During Their First Three Years,* December 1979.

R80-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1980 Models,* June 1980.

R80-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1980 Models During Their First Year, 1979 Models During Their First Two Years, 1978 Models During Their First Three Years,* December 1980.

R81-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1981 Models,* July 1981.

R81-2 *Insurance Losses, Collision Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1981 Models During Their First Year, 1980 Models During Their First Two Years, 1979 Models During Their First Three Years,* December 1981.

R82-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1982 Models,* July 1982.

R82-2 *Insurance Losses, Collision Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1982 Models During Their First Year, 1981 Models During Their First Two Years; 1980 Models During Their First Three Years,* December 1982.

R83-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1983 Models,* June 1983.

R83-2 *Insurance Losses, Collision Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1983 Models During Their First Year, 1982 Models During Their First Two Years, 1981 Models During Their First Three Years,* January 1984.

R84-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1984 Models,* June 1984.

R84-2 *Insurance Losses, Collision Coverages; Passenger Vehicles, Vans, Pickups, and Utility Vehicles; 1984 Models During Their First Year, 1983 Models During Their First Two Years, 1982 Models During Their First Three Years,* January 1985.

R85-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1985 Models,* July 1985.

R85-2 *Insurance Collision Report, Passenger Vehicles, Vans, Pickups, and Utility Vehicles, 1985 Models During Their First Year, 1984 Models During Their First Two Years, 1983 Models During their First Three Years,* January 1986.

R86-1 *Insurance Collision Report, Initial Results for 1986 Automobiles,* August 1986.

R86-2 *Insurance Collision Report, Passenger Cars, Vans, Pickups, and Utility Vehicles, 1986 Models During Their First Year, 1985 Models During Their First Two Years, 1984 Models During Their First Three Years* December 1986.

R87-1 *Insurance Collision Report, Initial Results for 1987 Automobiles,* July 1987.

R87-2 *Insurance Collision Report, Passenger Cars, Vans, Pickups, and Utility Vehicles, 1987 Models During Their First Year, 1986 Models During Their First Two Years, 1985 Models During Their First Three Years,* December 1987.

V78-1 *Automobile Insurance Losses, Non-Commercial Collision Coverages; Variations by Make and Series, Vans, Pickups and Utility Vehicles; 1978 Models During Their First Year, 1977 Models During Their First Two Years,* February 1979.

V79-1 *Automobile Insurance Losses, Non-Commercial Collisions Coverages; Variations by Make and Series, Vans, Pickups and Utility Vehicles; 1979 Models During Their First Year, 1978 Models During Their First Two Years,* April 1980.

V79-2 *Automobile Insurance Losses, Personal Injury Protection Coverages; Claim Frequency Results by Size of Claim for 1977, 1978, and 1979 Vans, Pickup Trucks, and Utility Vehicles,* October 1980.

V79-3 *Insurance Theft Losses; Vans, Pickups, and Utility Vehicles, 1979 Models,* May 1981.

V80-1 *Automobile Insurance Losses, Non-Commercial Collision Coverages; Variations by Make and Series, Vans, Pickups, and Utility Vehicles; 1980 Models During Their First Year, 1979 Models During Their First Two Years, 1978 Models During Their First Three Years,* December 1980.

V80-2 *Automobile Insurance Losses, Personal Injury Protection Coverages; Injury Claim Frequency Results by Size of Claim; Vans, Pickup Trucks, and Utility Vehicles, 1977-1980 Models,* September 1981.

I75-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974 and 1975 Models,* June 1976.

I75-2 *Automobile Insurance Losses, Percentage of Collision Claims with Associated Injury Claims for 1974 and 1975 Models,* March 1977.

I76-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974, 1975, and 1976 Models,* November 1977.

I76-2 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974, 1975, and 1976 Models,* September 1978.

I77-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1977 Models,* September 1978.

I78-1 *Automobile Insurance Losses, Personal Injury Protection Coverages; Claim Frequency Results for 1977 and 1978 Models,* September 1979.

I79-1 *Automobile Insurance Losses, Personal Injury Protection Coverages; Claim Frequency Results by Size of Claim for 1977, 1978, and 1979 Models,* October 1980.

I80-1 *Automobile Insurance Losses, Personal Injury Protection Coverages; Claim Frequency Results by Size of Claim; 1978-1980 Models,* September 1981.

I81-1 *Insurance Losses, Personal Injury Protection Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1979-1981 Models,* September 1982.

I82-1 *Insurance Losses, Personal Injury Protection Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1980-1982 Models,* September 1983.

I83-1 *Insurance Losses, Personal Injury Protection Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1981-1983 Models,* September 1984.

I84-1 *Insurance Losses, Personal Injury Protection Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1982-1984 Models,* August 1985.

I85-1 *Insurance Injury Report, Passenger Cars, Vans, Pickups, and Utility Vehicles; 1983-1985 Models,* August 1986.

I86-1 *Insurance Injury Report, Passenger Cars, Vans, Pickups, and Utility Vehicles; 1984-1986 Models,* August 1987.

A-1 *Automobile Insurance Losses, Collision Coverages; A Comparison of Results for 1972 and 1973 Models,* May 1974.

A-2 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Density, 1972 and 1973 Models,* September 1974.

A-3 *Automobile Insurance Losses, Collision Coverages; A Comparison of Results for 1973, 1974 and 1975 Models,* July 1975.

A-4 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Density, 1974 and 1975 Models,* December 1975.

A-5 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Body Style, 1974 and 1975 Models,* December 1975.

A-6 *Automobile Insurance Losses, Collision Coverages; An Investigation of Relationships Between Losses and Engine Specifications, Using 1973 Models,* June 1976.

A-7 *Automobile Insurance Losses, Collision Coverages; Annual Increases and Seasonal Variations 1972, 1973, 1974 and 1975 Models,* June 1976.

A-8 *Automobile Insurance Losses, Injury Coverages; A Preliminary Comparison of Results for Volkswagen Rabbits with Passive and Active Seat Belts, 1975 and 1976 Models,* June 1977.

A-9 *Automobile Insurance Losses, Collision Coverages; A Comparison of Collision Claim Size Distributions for 1974, 1975, and 1976 Models,* November 1977.

A-10 *Automobile Insurance Losses, Injury Coverages; Comparisons of Claim Frequencies of Volkswagen Rabbits with Automatic and Manual Seat Belts, 1975, 1976, and 1977 Models,* June 1979.

A-11 *Automobile Insurance Losses, Collision Coverages; The Consistency of the Loss Experience of Specific Vehicles Produced in Several Years, 1975 to 1978 Models,* June 1979.

A-12 *Automobile Insurance Losses, Collision Coverages; An Assessment of the Effects of the Federal Safety Bumper Standard on the Losses for 1972 Through 1978 Models,* June 1980.

A-13 *Automobile Insurance Losses, Personal Injury Protection and Collision Coverages; The Effects of Car Size on Crash Losses, 1977-1980 Models,* May 1981.

A-14 *Automobile Insurance Losses, Personal Injury Protection and Collision Coverages; Comparisons of the Loss Experience of Two- and Four-Door Cars, 1978, 1979, and 1980 Models,* June 1981.

A-15 *Automobile Insurance Losses, Personal Injury Protection and Collision Coverages; Relationships Between Injury and Collision Losses and Engine Options for Selected 1977-1979 Compact Cars,* June 1981.

A-16 *Automobile Insurance Losses, Collision Coverages; The Frequency of Claims Involving Salvage; Subcompact and Compact Cars; 1980 Models,* January 1982.

A-17 *Insurance Losses, Comprehensive Coverages; Non-Crash Fire Losses; 1979-1980 Models,* February 1982.

A-18 *Insurance Losses, Theft Coverages; The Distribution of Theft Loss Payment Amounts; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1981 Models During Their First Year, 1980 Models During Their First Two Years; 1979 Models During Their First Three Years,* June 1982.

A-19 *Insurance Losses, Theft Coverages; A Comparison of the Theft Loss Experience of General Motors Passenger Cars With and Without Factory-Installed Theft Deterrent Systems; 1980-1981 Models,* January 1983.

A-20 *Insurance Losses, Collision Coverages, A Comparison of the Collision Loss Experience of Subaru Models with 5 and 2.5 MPH Bumpers,* April 1983.

A-21 *Insurance Losses, Personal Injury Protection Coverages, Injury Claim Frequencies for Volkswagen Rabbits with Automatic and Manual Seat Belts, 1981 and 1982 Models,* April 1984.

A-22 *Insurance Losses, Collision Coverages, An Analysis of Salvage Credits, 1977 Through 1982 Model Year Cars,* July 1984.

A-23 *Injury and Collision Losses by Engine Option, Selected 1983 Models,* October 1985.

A-24 *Comparison of the Insurance Loss Experience of Unibody and Frame Construction Cars After a Collision Repair, 1981-82 Models,* October 1985.

A-25 *Relationships Between Losses and Vehicle Density, 1982-84 Models,* October 1985.

A-26 *Consistency of Model Year Injury Claim Frequency Results for Selected 1981-1983 Models,* May 1986.

A-27 *A Preliminary Evaluation of New York and New Jersey Insurance Injury Claim Results Before and After Enactment of Mandatory Seat Belt Legislation; 1983-85 Models,* May 1986.

A-28 *Insurance Injury Loss Experience in Eight States with Seat Belt Laws, 1983-86 Models,* July 1988.

A-29 *Insurance Losses Based on Garaging Location, 1985-87 Models,* June 1988.

A-30 *Automobile Insurance Losses, A Comparison of California and National Results,* May 1988.

T79-1 *Automobile Insurance Theft Losses by Make and Series; 1979 Models,* June 1980.

T80-1 *Automobile Insurance Theft Losses by Make and Series; 1979 and 1980 Models,* April 1981.

T81-1 *Insurance Losses, Theft Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1981 Models During Their First Year, 1980 Models During Their First Two Years, 1979 Models During Their First Three Years,* May 1982.

T82-1 *Insurance Losses, Theft Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1982 Models During Their First Year, 1981 Models During Their First Two Years, 1980 Models During Their First Three Years,* May 1983.

T83-1 *Insurance Losses, Theft Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1983 Models During Their First Year, 1982 Models During Their First Two Years, 1981 Models During Their First Three Years,* May 1984.

T84-1 *Insurance Losses, Theft Coverages; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1984 Models During Their First Year, 1983 Models During Their First Two Years, 1982 Models During Their First Three Years,* March 1985.

T85-1 *Insurance Theft Report; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1985 Models During Their First Year, 1984 Models During Their First Two Years, 1983 Models During Their First Three Years,* April 1986.

T86-1 *Insurance Theft Report; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1986 Models During Their First Year, 1985 Models During Their First Two Years, 1984 Models During Their First Three Years,* May 1987.

T87-1 *Insurance Theft Report; Passenger Cars, Vans, Pickups, and Utility Vehicles; 1987 Models During Their First Year, 1986 Models During Their First Two Years, 1985 Models During Their First Three Years,* June 1988.